School of Public Health

Breastfeeding and Postnatal Depression in Sabah, Malaysia

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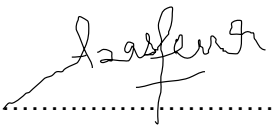
This thesis is presented for the Degree of
Doctor of Philosophy
of
Curtin University

February 2013

Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: 

Date: …20th February 2013……..

Acknowledgements

There are many people to whom I am indebted to in the journey of this doctoral study without whose support, guidance, collaboration and encouragement, this thesis would not have been possible. First and foremost, I would like to express my most sincere gratitude to my supervisor, Professor Colin Binns for all his invaluable help, advice and guidance from the conception to completion of this study. I cannot thank him enough for all his inspiration, encouragement and patience during my study. I take this opportunity to wish him all the happiness in life. I will cherish his kindness forever.

Special thanks to my co-supervisor, Professor Andy Lee for his expertise and advice on the statistical analysis of the data. I would also like to thank the Dean of the School of Public Health of Curtin University, Professor Bruce Maycock, the chairperson of my thesis committee, Dr Kay Sauer, and all academic staff and supporting staff members in the School of Public Health, Curtin University for their help and support especially Miss Leslie Thompson for her technical help.

I would also like to thank the Ministry of Higher Education Malaysia for the scholarship for my study, the State Health Department of Sabah for the permission in conducting this research and last but not least, to the enumerators, nurses at the clinics, the mothers involved in this study and those involved indirectly.

Finally, I would like to extend my greatest appreciation to my mother, my husband and my children for all their love, support, encouragement and sacrifices throughout these years. To my husband, this thesis would not have been possible without your encouragement and sacrifices. I would also like to thank my brother, sisters and friends who have always been there for us and to each and every one who have contributed in their own ways.

Abstract

The aim of the study is to describe the risk factors, including postpartum depression, for the discontinuation of breastfeeding before six months in Sabah, Malaysia and to identify the risk factors for postpartum depression among Sabah women. This is a prospective study of a cohort of 2072 women who were recruited at their antenatal visit at five Maternal and Child Health Clinics in the district of Kota Kinabalu. After birth the mothers were followed up with a sample of1598 at 1 month, 1326 at 3 months and 1184 at 6 months postpartum visits. A total of 942 mothers attended all the four interviews. Three sets of questionnaires which included two scales, the Iowa Infant Feeding Attitude Scale (IIFAS) and the Edinburgh Postpartum Depression Scale (EPDS) were administered to these mothers by trained enumerators. Multivariate analysis involved the Multivariate Logistic Regression Analysis, Generalised Logistic Estimating Equation Analysis and the Cox Proportional Hazard Analysis.

The result of the study shows that the rate of breastfeeding initiation was 95.6%. The 'full breastfeeding' rates were 67.2%, 49.8% and 36.1% at 1 month, 3 months and 6 months respectively. The 'any breastfeeding' rates at the same time intervals were 95.9%, 88.2% and 80.7%. Using the Edinburgh Postnatal Depression Scale, the prevalence of antenatal depression (i.e. a score ≥12) was 13.8% while the prevalence of postpartum depression was 7.6%, 7.2% and 8% at 1 month, 3 months and 6 months respectively. Antenatal depression was a strong risk factor for postpartum depression. The risk factors associated with antenatal depression included low 'family household income', 'on family planning', 'unhappy with the pregnancy', 'unplanned pregnancy' and 'worry during pregnancy'. Risk factors-associated with postpartum depression include 'antenatal depression', 'low family household income', 'not receiving husband's help in taking care of baby', 'having problems most of the time and have problems with childcare during confinements'.

Predictors for 'any breastfeeding' duration was 'intention to breastfeed' while predictors for 'full breastfeeding' duration were 'mother's employment status', 'husband helps take care of the baby', 'intention to breastfeed' and 'not attending breastfeeding classes'. Traditional and cultural factors which were associated with postpartum depression were 'having food taboos during confinement', 'being confined in the house only' and 'mothers perceptions about the confinement

practices'. This study shows that there are many risk factors in the development of antenatal and postpartum depression among the Sabahan. However, there was neither statistically significant association between breastfeeding duration and antenatal depression nor postpartum depression. However, it was found that more mothers who were formula feeding had an increase in their EPDS scores from 1 month to 6 months compared to the mothers who were on 'full breastfeeding' which was statistically significant (p=0.003).

Abbreviations

AOR	Adjusted Odds Ratio
BDI	Beck Depression Inventory
CES-D	Centre for Epidemiologic Studies Depression Scale
CI	Confidence Interval
CIS-R	Clinical Interview Schedule-Revised
DSM-IV	Diagnostic and Statistical Manual of Mental Disorder IV
EPDS	Edinburgh Postpartum Depression Scale
GEE	Generalised Logistic Estimating Equations
IIFAS	IOWA Infant Feeding Attitude Scale
NHMS	National Health and Morbidity Statistics
OR	Odds Ratio
PND	Postpartum depression
PSE	Present State Examination
SD	Standard Deviation
SPI	Standardized Psychiatric Interview
WHO	World Health Organisation
ZDS	Zung Depression Scale

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CHAPTER 1: INTRODUCTION

This chapter provides a synopsis of the study. This includes the background of the study, description of Sabah, Malaysia, significance of the study, aim and objectives of the study, scope and outline of the thesis, terminology used in this study and limitations of the study.

1.1 Background of the study

Postpartum depression is defined as a major depressive disorder in the Diagnostic and Statistical Manual of Mental Disorder (DSM-IV-TR) with postpartum onset, beginning within the first four weeks after delivery (American Psychiatric Association, 2000). Many epidemiological studies expand the time criteria to within 6-12 weeks postpartum (Hiltunen et al., 2004). Postpartum depression is a concept which has been described in the lay literature for many years and entered the medical literature in the 1950's.

The worldwide prevalence of postpartum depression is generally estimated to be about 10-15% but reported rates vary considerably between countries (Ohara and Swain, 1996). Lower rates have been reported from Singapore, Malta, Denmark and Malaysia (0.5 – 9%) and much higher rates in Guyana, Costa Rica, Italy, Chile and Taiwan (34-37%) (Halbreich and Karkun, 2006a). These differences might be due to the differences in socio-economic environments, cross-cultural variables, postpartum support service and its stigma and biological vulnerability factors (Halbreich and Karkun, 2006a). A more recent large prospective cohort study of 12361 postpartum women in the Australian *Beyond-blue* National Postpartum Depression Programme found that 7.5% women had depressive symptoms at 6-8 weeks postpartum (Buist et al., 2008a). It is also likely that the differences reflect different diagnostic tools and different interpretations of the diagnostic criteria. Gavin et al. (2005) concluded that prevalence of major depression is similar within the same socio-economic status while minor depression may be more prevalent among those in lower socio-economic status.

There is some evidence that postpartum depression is associated with early termination of breastfeeding (Cooper et al., 1993, Taveras et al., 2003, Akman et al.,

2008, Henderson et al., 2003, Dunn et al., 2006b). In one study, 7 out of 8 mothers who had higher depression scores had discontinued breastfeeding at 4 months and this was statistically significantly higher than those who did not breastfeed (Akman et al., 2008). In the two cohorts in his study, Cooper et al. (1993) found a significant association between depressive symptoms and breastfeeding cessation. However, he pointed out that it was not clear if dissatisfaction with breastfeeding was the consequence of the depressive symptoms or the infant problems causes the depressive symptoms or if there are other factors between breastfeeding and postpartum depression.

However, the association between postpartum depression and breastfeeding is inconsistent. Despite the studies mentioned above, in other studies, early depressive symptoms were not found to be associated with feeding modes (McKee et al., 2004a, Lau and Chan, 2007, Cooke et al., 2007, Chung et al., 2004). Cooke et al. (2007) in her study of high breastfeeding initiation (91%) found that breastfeeding problems in the first 2 weeks after birth do not seem to be related to antenatal distress or anxiety scores. Hellin and Waller (1992a) reported that there were no significant differences in anxiety or depression between women who breastfed and those who bottle-fed at any time of the measurement.

In Malaysia, the first reported study on postpartum depression focused on the prevalence of postpartum depression among the three common ethnic groups in Malaysia (Kit et al., 1997). The point prevalence at 6 weeks postpartum was 3.9% among 154 women studied. In another study, Kadir et al. (2006) had looked upon the postpartum depression and socio-cultural practices among the Malays which reported 20.7% period prevalence at 4-6 weeks postpartum among 377 women.

1.2 Significance of the study

This will be the first study to examine breastfeeding and postpartum depression in Malaysia. These variables are important in the health of infants and mothers in Malaysia. Malaysia is rapidly developing and aims to become a developed country by 2020. It is important to monitor the effects of development on traditional cultural patterns and possible impacts on postpartum depression and on breastfeeding. This study will document the prevalence of postpartum depression in Sabah, where there

have been no previous studies on this subject. This study will add to the literature on the risk factors found in this ethnic group. Secondly, it will provide current information on breastfeeding practices in Sabah, Malaysia and understanding of the factors that influence breastfeeding practices from the social, cultural, psychological and economical aspects. Thirdly, there has not been a clear association established between breastfeeding and postpartum depression in the published literature. There have only been a small number of studies in developing countries which address possible links between postpartum depression and infant feeding practices. Breastfeeding is essential for infant nutrition in both developed and developing countries and it is important to monitor factors that may have impacts on breastfeeding. Lack of such studies is of particular concern. Findings from this study will add to the knowledge from a developing country perspective.

Undetected and untreated postpartum depression may impact on the mother, the newborn infant, the spouse and other family members. Early detection is important for further intervention and consequently prevention of postpartum depression in women in the high risk group. Studies which highlight the magnitude of this problem with current reliable results are of public health important. These studies should incorporate culture specific tools and methods to be able to detect the problem in the society. Estimates from other studies conducted in Malaysia are presented in the next chapter.

No recent studies have been conducted on associations between breastfeeding and postpartum depression in Malaysia. Considering that available studies are now several decades old, a more recent study with large and reliable sample size is needed to provide recent information on breastfeeding and postpartum depression in Sabah. Also, there are no published reports on antenatal and postpartum depression in Sabah. Results from this study will assist in developing public health programs for improving the nutrition and wellbeing of infants and mothers in this region of Malaysia.

1.3 Description of Sabah, Malaysia

Sabah is the second largest state in Malaysia and is located on the northern part of the Borneo Island, the third largest island in the world. Sabah is also known as “The Land below the Wind” because of its location of the monsoon-prone region near the Philippines. Kota Kinabalu is the capital city of Sabah.

Sabah is not only rich in natural beauty and resources but also in the cultural heritage of its heterogenous population. Sabah has an estimated population of 3.2 million. The indigenous people of Sabah include about 30 groups with 50 indigenous languages and 80 dialects. The largest ethnic group is the Kadazan-Dusun who made up nearly one-third of the population. The second largest is Bajau followed by the Murut. The largest non-indigenous ethnic group is the Chinese (9.6%)

Kota Kinabalu has a population of 436100 with a population density of 1242 per square km while Penampang has the population of 159 600 with the density of 343 per square km (Malaysian Department of Statistic, 2010). Islam is the most common religion in Sabah (63.7%) followed by Christianity (27.8%) and Buddhism (12%). Others include traditional indigenous religions (1%), Confucianism (0.4%), others (0.3%) and Hinduism (0.1%). Sabah has the second highest proportion of Christians in Malaysia after Sarawak.

Figure 1.1: Map of Sabah (Chang and Hutton, 1996).

1.4 Aim and objectives of the study

The overall aim of the study is to describe the risk factors, including postpartum depression, for the discontinuation of breastfeeding before six months in Sabah, Malaysia.

1.4.1 Research Questions

1. What are the rates of breastfeeding initiation and breastfeeding duration in Sabah?
2. What are the risk factors associated with the development of postpartum depression in Malaysia?
3. What are the relationships between postpartum depression on breastfeeding initiation and duration?
4. What are association of breastfeeding on the development of postpartum depression?

1.4.2 Specific Objectives

1. To describe the association between postpartum depression and breastfeeding practices in Sabah, Malaysia.
2. To identify the effects of breastfeeding on the occurrence of postpartum depression.
3. To determine the risk factors of postpartum depression in this population.
4. To describe the factors associated with breastfeeding practices.
5. To measure the effect of cultural/traditional beliefs and practices on postpartum depression.

1.5 Scope and outline of the thesis

A prospective cohort study of the association of breastfeeding and postpartum depression was conducted in Sabah, Malaysia. There are no published reports of such study in Sabah, Malaysia. The participants consisted of 2072 pregnant mothers from the districts of Kota Kinabalu and Penampang in Sabah, Malaysia. They were recruited from five Maternal and Child Health Clinics in these two districts at their 36-38 weeks of antenatal visit and followed up at their 1 month, 3 months and 6 months postpartum visits.

The mothers were interviewed face-to-face by the researcher and five trained enumerators using a structured questionnaire to collect the information on demographic characteristics, breastfeeding, attitudes towards infant feeding and the prevalence of depressive symptoms. Data were analysed and presented in the form of descriptive statistics using the univariate analysis. Multivariable regression

analyses were used to measure the association of the variables and their effects as potential risk factors for breastfeeding and postpartum depression.

This thesis is presented as follows:

- Chapter One provides a brief introduction about breastfeeding and postpartum depression. It also mentions the aim and objectives of the study.
- Chapter Two reviews the literature on breastfeeding and postpartum depression, breastfeeding in Asia and Malaysia, postpartum depression in Asia.
- Chapter Three describes the methodology of the study specifically the study location, study design and data collection procedures, research instruments, statistical analysis and ethical considerations
- Chapter Four presents the results of the study in the form of descriptive tables and graphs.
- Chapter Five is the discussion of the results and related literature
- Chapter Six is the conclusion and summary of the findings of this study. Recommendations for future study are also included.
- All the research instruments specifically the ethics approval letter, information sheet, consent form and the questionnaires are in the Appendices.

1.6 The definition of terms used in this study

The definitions of breastfeeding used in this study are consistent with 'The Australian National Breastfeeding Strategy 2010-2015', the 'WHO Infant Strategy', and are in general use in Australia (Anon, 2009, Binns et al., 2009, WHO, 2008).

- **Exclusive breastfeeding**: Women give only breastmilk to infants (including milk expressed). Only prescribed drops or syrups (vitamins, minerals and medicine) are allowed and does not allow the infant to receive anything else.
- **Full breastfeeding (predominant)**: Women give breastmilk (including milk expressed) as the predominant source of nourishment. Infants are allowed to receive liquids (water and water-based drinks, fruit juice, oral rehydration solutions, ritual fluids and drops of syrup (vitamins, minerals and medicine). However, it precludes the use of formula and solids.
- **Any breastfeeding**: Women give fully breastmilk and any food or liquid including non-human milk.

- **Complementary breastfeeding:** Women give some breastmilk and solid and any food or liquid including non-human milk.
- **Ever breastfed**: Infants receive breastmilk or colostrum on at least one occasion.
- **Breastfeeding initiation**: The infant's first intake of breastmilk(Webb et al., 2001).
- **Timely initiation of breastfeeding:** Infant being breastfed within the first hour of life.
- **Breastfeeding duration**: The total length of time an infant received any breastmilk from initiation through until weaning is complete(Webb et al., 2001).
- **Prelacteal feeds**: Any feeds given before the onset of Lactogenesis II, which is the onset of copious lactation that occurs within four days of birth (Neville, 2001).

Limitations

The findings of this study cannot be generalized to Malaysia as a whole because the state of Sabah is different from the Peninsular Malaysia in many ways, namely, the ethnic groups, the socio-economic status and the high immigrant population. On the other hand, the strength of this study is the large sample size particularly at the time of the antenatal visit. The sample is representative of the population of Sabah as it was conducted in the five main Maternal and Child Health Clinics in the most populated district in Sabah. Although most of the mothers are from the lower socio-economic status as the respondents are from the government clinics (richer women usually go to private clinics), this is representative of the majority of women living in the sub-districts involved in this study and thus is representative of the scenario in Sabah.

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter provides an extensive review of the literature related to the topic of the study. An introduction on breastfeeding and its advantages are described in the first part of this chapter. Breastfeeding practices and associated factors in Asian countries in general and in Malaysia in particular are also being reviewed. Postpartum depression and antenatal depression and their associated risk factors are also presented. This chapter also provide a comprehensive review on the associations of both antenatal and postpartum depression with breastfeeding and cultural factors described separately in different sections.

2.1 BREASTFEEDING

Breastfeeding provides the most appropriate nutrition for all infants. Breastmilk substitutes are by no means comparable to human breastmilk. The benefits of breastfeeding have been documented in many studies. Despite all the benefits breastfeeding has to offer, many mothers breastfeed for a short duration of time or not breastfeeding at all for many reasons either intentionally or unintentionally.

Breastfeeding gives many health benefits to the mother and the baby. To the mother, breastfeeding reduces the risk of postpartum blood loss by increasing the rate of uterine contraction, lowers the risk of pre-menopausal breast cancer and also reduces the risk of ovarian cancer, reduces lifetime menstrual blood loss, may reduce rate or severity of infections, may reduce the risk of spinal and hip fracture after menopause, and may support bonding with the infant as well as an improved sense of self-esteem and success with mothering (Labbok, 2001). Breastfeeding is protective against infectious diseases such as upper and lower respiratory tract infections, gastrointestinal illnesses and otitis media during the infant period and beyond(Heinig and Dewey, 1996).

A meta-analysis of 47 studies carried out in 30 countries on 50302 women indicated that the relative risk of breast cancer is reduced by 4.3% (95%CI 2.9-5.8) for each year that a woman breastfeeds in addition to a reduction of 7.0% (5.0-9.0) for each

birth (Beral, 2002). Allen and Hector (2005) reviewed the evidence regarding the health benefits of breastfeeding in developed countries in 44 reviews and studies published between 1996 and 2005. They reported the various benefits of breastfeeding on the infants and the mother as described in Table 2.1 below.

Table 2.1: Evidence for health advantages of breastfeeding to infants, children, mothers and adults in developed countries

Level of evidence[1]	**Health outcome for which breastfeeding is protective**		
	Infants and children	Chronic disease in childhood and/or later life	Mothers
Convincing[2]	gastrointestinal illnesses otitis media respiratory tract infections neonatal necrotising enterocolitis		slow maternal recovery from childbirth reduced period of postpartum infertility premenopausal breast cancer
Probable[3]	asthma and allergy cognitive ability/intelligence some childhood leukaemias urinary tract infection inflammatory bowel disease coeliac disease sudden infant death syndrome	obesity	postmenopausal breast cancer ovarian cancer rheumatoid arthritis
Possible[4]	insulin dependent Diabetes Mellitus, bacteraemia, meningitis, dental occlusion	ischaemic heart disease, atherosclerosis, risk factors for • atherosclerosis and heart disease • type2 diabetes and metabolic syndrome	maternal depression reduced maternal-infant bonding endometrial cancer osteoporosis and bone fracture no or slow return to pre-pregnancy weight

Notes:
1. The classification of evidence of the relationship between breastfeeding and health benefits is based on a comprehensive overview of the evidence base (systematic reviews, meta-analysis, reviews, recent single studies)
2. Convincing: evidence of relationship was critically identified in a review and/or shown in meta-analyses to be significant
3. Probable: most studies have found an association, but confirmation is required in more, or better designed studies
4. Possible: too few methodologically-sound studies

Source: (Allen and Hector, 2005)

The benefits of breastfeeding increase with duration and exclusivity (Goldman et al., 2007). Exclusive breastfeeding for the first months of life, with continued breastfeeding through the second year of life, has been recommended for infants and young child feeding globally (WHO, 2002). Exclusive breastfeeding means that the infants should receive only breastmilk and nothing else, with exceptions such as oral rehydration solution, syrups, vitamins, minerals and medicines. The current recommendations to continue exclusive breastfeeding for 6 months as opposed to 4 months was based on scientific evidence.

Exclusive breastfeeding for 6 months of life in contrast to less than four months was associated with a lower risk of gastro-intestinal infection and rapid motor development (Dewey et al., 2001). Quigley et al. (2012) in a sample of 11101 infants had found that prolonged breastfeeding was associated with higher cognitive development scores and suggested that breastfed babies are 1 to 6 months ahead in terms of cognitive performance compared to those who have never been breastfed. Advantages of exclusive breastfeeding on health and economic advantages for resource-poor countries have been documented extensively worldwide (Arifeen et al., 2001, Black et al., 2008).

2.1.1 Breastfeeding in Asia

The World Fertility Survey which was carried out in mid to late 1970s in 40 developing countries showed that breastfeeding is more common in the Asian and Pacific countries compared to the Caribbean and Latin American region. Except for Malaysia and the Philippines, nearly all infants in the Asian countries were breastfed for at least a short period of time. In this survey, for Malaysia, percentage of ever breastfed babies was 74.4% and the average duration of breastfeeding was 8 months (Ferry, 1981).

More recently, Senarath et al. (2010) compared infant and young child feeding practices (0-23 months) in 7 countries in Southeast Asia and 2 from East Asia. Results show that more than 93% of infants were ever breastfed. Timely initiation of breastfeeding varied from 32% in Indonesia to 46% in Timor-Leste. Summary of the infant feeding indicators are as in Table 2.2 below.

Table 2.2: Rates of exclusive breastfeeding, predominant breastfeeding, bottle-feeding in East and Southeast Asian countries (2000-2005)

Country	Sample size	Exclusive breastfeeding * (%)	Predominant breastfeeding * (%)	Bottle-feeding (%)
Indonesia	5610	38.9	6.9	23.3
Philippines	2491	33.7	20.4	48.7
Timor-Leste	2166	30.7	7.7	12.5
Cambodia	2953	60.1	22.8	11.2
Vietnam	826	15.5	36.9	21.1
Laos	1959	22.5	57.8	5.5
Myanmar	5860	11.0	65.7	5.8
Korea	1360	52.1	32.9	3.0
Mongolia**				31.4

* Breastfeeding rates among infants below 6 months

** For Mongolia, data are available for infants aged 6-23 months.

Data are from secondary analyses of cross-sectional data from available Demographic and Health Surveys (DHS; Indonesia 2002-2003, Philippines 2003, Timor-Leste 2003, Cambodia 2005 and Vietnam 2002); Multiple Indicator Country Surveys (Lao People's Democratic Republic 2000); National Nutrition Surveys [Democratic People's Republic of Korea (DPR Korea) 2002 and Myanmar 2000]; National Nutrition Assessment (Mongolia 2002).

Adapted from (Senarath et al., 2010)

The above data shows that exclusive breastfeeding rate among infants below 6 months of age varied from 11.0% in Myanmar to 60.1% in Cambodia while bottle-feeding rate varied from 3.0% in Korea to 48.7% in the Philippines. It was also reported that 'ever breastfed' rate was high with the highest rate of 99.9% in Myanmar and the lowest rate of 88.0% in the Philippines (Senarath et al., 2010). However, the use of period prevalence in this study made it difficult for comparison with other studies which used point prevalence. The exclusive breastfeeding rates in this study should also be interpreted with caution. According to Binns et al. (2009), the use of 24-hour recall data may miss including many episodes of non-breastmilk feeds and lead to overestimations of the prevalence of exclusive breastfeeding. Exclusive breastfeeding rate in the table above is questionable because it is a period prevalence. Exclusive breastfeeding rate differs greatly at 1 month and 6 months of the age of the infant. Therefore, for exclusive breastfeeding, period prevalence should be interpreted with caution.

Another study (Senarath et al., 2010) which compares the factors associated with non-exclusive breastfeeding among infants aged 6-23 months based on the same data as the above study reported that lower excluding breastfeeding rates were found to be associated with:

- Working mothers with a significant difference in Indonesia.

- Higher educational attainment and was significantly different in the Philippines
- In inverse relationship with household wealth index in Indonesia, Philippines and Timor-Leste (indicating the lowest rate in the richest family). In Vietnam and Cambodia, both the poorest and the richest had the lowest rates than those in the middle.
- Those who delivered at a health facility which is significant in the Philippines and Timor-Leste.
- In deliveries assisted by health professionals compared to those delivered by traditional birth attendants or others.
- Mothers who live in urban areas compared to rural.

In contrast to the finding by Senarath et al. (2010), a study in Malawi on 349 mother-infant pairs found that infants born in health facilities were positively associated with exclusive breastfeeding (Kamudoni et al., 2007). Additionally, in Sri Lanka, antenatal and postpartum contacts with healthcare workers were related to improved breastfeeding practices (Department of Census and Statistics Sri Lanka, 2001). Conversely, more antenatal visits were associated with the non-exclusive breastfeeding rate in the Philippines in contrast to a higher exclusive breastfeeding rate in Indonesia (Senarath et al., 2010).

Senarath et al. (2010) also found that exclusive breastfeeding dropped significantly with the age of infants, irrespective of the country and therefore suggested that special interventions to address breastfeeding problems in order to sustain exclusive breastfeeding throughout the 6 months period from birth need to be implemented such as

- the period/length of maternity leave should be prolonged/upgraded,
- discourage the giving of breastmilk substitutes, bottle-feeding, prelacteal feeds and early weaning especially by the rich and educated families,
- more attention to first time mothers,
- formation of breastfeeding support groups at community level. Instead,
- the rich and educated women should act as role models in promoting exclusive breastfeeding and discouraging breastmilk substitutes.
- that breastfeeding programs should target working mothers, educated women, rich households and first time mothers.

In Hong Kong, a population representative cross-sectional survey had been conducted on 3161 mothers of infants below 6 months of age. Breastfeeding was initiated by 50.9% mothers. Rate of breastfeeding in the first 40 days of life was 18.4% and dropped to 10.8% by the second month and 5.8% by 3 months of life. Current breastfeeding rate was only 8.4%. Among the mothers who were breastfeeding, half of them (49.1%) were partially breastfeeding. Husband was reported to be the most influential person on breastfeeding initiation and duration by 43.3% mothers. Perceived benefits of breastfeeding were infant-oriented health benefits [enhanced immunity (85.2%) and ideal nourishment for infants (81.6%)]. 'Mother oriented' rather than 'child oriented' difficulties and concern were the major factors giving rise to anxiety and frustration encountered during breastfeeding which were avoidance of certain foods, confined at home, breast engorgement and leakage caused nuisance and embarrassment (Lee et al., 2006).

Leung et al. (2006) reported that in Hong Kong (n=213), initiation rate of breastfeeding was 66.7% and only 13.4% breastfeed exclusively in the first 6 months. There was a statistically significant association between breastfeeding initiation with infants' birth order, and mother's and father's education level. First and second birth order infants were more likely to be breastfed than those of successive birth orders. Highly educated mothers were more likely to initiate breastfeeding than mothers with lower education level. No statistically significant associations between the initiations of breastfeeding with mode of delivery, infant's sex, mother's age, mother's working status and parent's socio-economic status.

In another study in Hong Kong among 230 first-time Chinese mothers, reasons for not breastfeeding include embarrassment of doing so in public, insufficient breastmilk and lack of breastfeeding facilities in public places and at work (Kong and Lee, 2004). In this study, encouragement and support from husband is one of the encouraging factors of breastfeeding other than higher education level, knowledge about breastfeeding, feelings of responsibility and closeness to baby.

In Vietnam, in a study of 115 women, it was reported that the mothers discarded the colostrum and did not breastfeed their babies directly after birth. Infant formula and solids was introduced after four or five months with reasons being that mothers working, not enough breastmilk and wanted extra nutrition for the baby (Lundberg and Trieu, 2011). Studies in India also showed that mothers discarded the colostrum

before putting the babies to the breast (Prasad and Costello, 1995, Bandyopadhyay, 2009).

In Saudi Arabia, a nationwide nutritional survey was conducted in 2004-2005 on 5339 mothers of children less than 3 years of age. The breastfeeding initiation rate was 91.6%. Timely initiation of breastfeeding was 23.2% and was delayed beyond 6 hours after birth in 28.1%. Bottle-feeding was introduced by 1 month of age in 51.4% infants and 90% by 6 months. Complementary breastfeeding dropped from 88.6% at birth to 1.8% at 12 months. Reasons for breastfeeding cessation among these mothers were insufficient milk, illness of the mother, breast problems and illness of the baby (El Mouzan et al., 2009).

Comparison of the key indicators (please refer to Table 2.3 on page 17) of breastfeeding and complementary feeding in four South Asian countries (India, Bangladesh, Nepal and Sri Lanka) was conducted by Patel et al. (2010). The ever-breastfed rate was very high (98.0%-99.9%) in the four countries. Breastfeeding was continued to the end of the first year by a majority of the mothers (86%-98%) and later dropped by about 16% in India and 10% in Sri Lanka while Nepal and Bangladesh sustained above 90% to the end of the second year. It was reported that analyses of feeding status by 24 hour recall showed that a considerable proportion of infants under 6 months of age had been given plain water, juices or other non-milk liquids resulting in low rates of exclusive breastfeeding. Details of the findings in this study are as in Table 2.3 below.

In summary, in Asia there is variation in the timing of breastfeeding initiation. In Hong Kong, breastfeeding initiation was lower (50-66%) compared to the middle-eastern and South Asian countries. The most marked difference is that in a more developed country, breastfeeding is more common among mothers who are highly educated whereas it is more common in the less educated mothers in the less developed country.

Table 2.3: Infant and young child feeding indicators in 4 South-Asian countries

	India	**Bangladesh**	**Nepal**	**Sri Lanka**
Sample size (0-23 months)	20,108 India National Family Health Survey 2005–06	2482 Bangladesh Demographic and Health Survey 2004	1906 Nepal Demographic and Health Survey2006	1127 Sri Lanka Demographic and Health Survey2000
Initiated breastfeeding within the first hour after birth	23.5%	27.5%	35.4	56.3
Had ever breastfed their infant	99.2%	99.9%	99.5	99.7
Currently breastfeeding	89.8%	97.3%	98.1	85.0
Currently bottle-feeding (infants <12months)	14.8%	22.4%	3.5	27.2
Exclusively breastfeeding rate	46.4%	42.5%	53.1	(no data)
Infants aged 6 to 9 months received complementary foods	56.7%	62.3%	74.7	93.4
Factors associated with higher rates of exclusive breastfeeding	Higher numbers of antenatal care visits, mother formerly married	Higher parity, female infant		Mother seen by midwife at home for postpartum visit
Factors associated with lower rates of exclusive breastfeeding	Delivered at health facility, wealthier household, urban residence	Lower maternal education, maternal age ≥35, wealthier household, birth attended by friends and relatives	Higher numbers of antenatal care visits	Maternal age 25-29 years

Table 2.3: Infant and young child feeding indicators in 4 South-Asian countries (cont.)

	India	Bangladesh	Nepal	Sri Lanka
Factors associated with higher rates of timely initiation of breastfeeding	Delivered at health facility, working, more antenatal visits, listened to the radio, increasing age of infant	Wealthier households, more antenatal visits	Mother involved in household decisions	
Factors associated with lower rates of timely initiation of breastfeeding	Caesarean delivery	Urban mothers	Caesarean delivery	Caesarean delivery, mother not seen by midwife during pregnancy
Factors associated with higher rates of bottle-feeding	Caesarean delivery, wealthier household, working mother, higher maternal education , urban residence, absence of postpartum check-up, birth attended by health professional	Partner has higher education level, older maternal age, wealthier household	Urban residence	Ever-employed mother, urban residence, formerly married
Factors associated with lower rates of bottle-feeding	rural residence	Mother not working, longer birth interval, female infant	Birth attended by friends and relatives	Mothers had higher education
Factors associated with higher rates of timely complementary feeding	Increasing age of infants, mothers who had ≥7 antenatal visits, mother watched television	Increasing age of infants, 3-6 antenatal clinic visits	Higher maternal education, maternal age ≥35, increasing age of infant	
Factors associated with lower rates of timely complementary feeding	Shorter birth interval			Living in urban or tea estate areas

Sources from (Patel et al., 2010), (Mihrshahi et al., 2010) and (Patel et al., 2010)

2.1.2 Breastfeeding in Malaysia

2.1.2.1 Breastfeeding Promotion Programme

Over the past decade, the significance of breastfeeding has been recognized by the Malaysian government through the formulation of the National Breastfeeding Policy in 1993 in accordance with the World Health Assembly Resolution 54.2 (Ministry of Health Malaysia, 2006) whereby exclusive breastfeeding was recommended for the first 6 months of life and continued breastfeeding up to 2 years. Additionally, the Ministry of Health has implemented the Baby Friendly Hospital Initiative since 1992 and currently there are a total of 128 Baby Friendly Hospitals in the country. Since 1979, Ministry of Health Malaysia has formulated the Code of Ethics for Infant Formula Products with the overall aims of to hold the supremacy of breast milk.

Two significant strategies regarding breastfeeding initiatives in Malaysia are the Baby-friendly Hospital Initiatives (introduced in 1993) and the Code of Ethics for infant formula (implemented in June 1979). Malaysia is the first country in Western Pacific Region and third in the world to have achieved 100% Baby-friendly Hospitals at Government facilities. Baby-friendly Hospital Initiative was one of the most effective measures to support breastfeeding practices through participation and commitment from both the government and private hospitals. The MOH continuously provide intensive health education programs, conducting lactation management courses for health workers and counsellors. Activities under the Code of ethics for Infant Formula Products were (i) vetting of informational and educational materials on infant formula products; and (ii) monitoring of code violations (Anon, 2007).

Among the activities and policies of the government and non-governmental agencies that had given considerable support for the promotion of breastfeeding and child feeding include;

a. The provision of 60 days maternity leave for 5 successive deliveries in the public sector and further 3 months no-pay leave following the maternity leave.
b. The provision of breastfeeding facilities in some work places and public places.
c. The provision of tax relief for companies that make available child care facilities at their work place.

d. The active involvement of non-government organisations like the Malaysian Breastfeeding Mothers Advisory Association whose activities include giving information, support and counselling to mothers. Professional bodies such as the Nutrition Society of Malaysia, Malaysian Medical Association and the Malaysian Paediatric Association also played a role in promoting breastfeeding and child feeding (Don, 2003).

In line with the International Code of Marketing of Breastmilk Substitutes, a Malaysian Code of Ethics for Infant Formula Products was drawn up in 1979 which was subsequently amended in 1983, 1985 and 1995. The Code covers relevant aspects of marketing, distribution and product information on all infant formula products. It also provides guidelines for a code of conduct for health professionals and personnel employed by the milk industry. The committees set up under the Code at the national level are the:

a. National Committee to formulate policies on the promotion, protection and support of breastfeeding.
b. Vetting committee to vet all materials, including product labelling related to Infant Formula Products.
c. Disciplinary committee to co-ordinate and act on investigations on alleged code violations.

The effectiveness of these programs is mentioned in the following sections in this chapter.

2.1.2.2 Breastfeeding initiation and duration

One of the earlier studies on breastfeeding in Malaysia was based on the Maternal Health and Early Pregnancy Wastage study conducted in 1973-1974. It was reported that 64.2% out of 8755 infants were initially breastfed among which 88.9% were Malays, 69.7% Indians and 42.3% Chinese. Breastfeeding was far less popular in the urban areas than in the rural areas where only 47% urban infants were breastfed compared to 77.5% infants in the rural areas. In urban areas, almost half Malays and Indians and two-thirds of the Chinese stopped breastfeeding before the third month. In rural areas, 30% Malays, 40% Indians and 44% Chinese stopped before the third month (Pathmanathan, 1978).

A review was conducted on the data of the 1976 to 1977 Malaysian Family Life Survey which provided breastfeeding information on 5592 live births. There was a statistically significant decline in both the proportion of children who had ever been breastfed and the duration of breastfeeding during the years since World War 11. For children born before 1950, more than 94% were breastfed for at least a short period of time but by the years 1970 to 1974, the proportion had decreased to 75%. The duration of breastfeeding declined from 13 months to 10.1 months and the duration of full breastfeeding decreased from 2.3 to 1.1 months and this was due to the increase in weaning during the first year of life. The proportion of children who had ever been breastfed declined in both rural and urban areas but the decline was slightly greater for urban children (Notzon, 1984).

Table 2.4: Percentage of infants 'ever breastfed' and duration of full and total breastfeeding by infants' year of birth

	Percentage ever breastfed	Mean breastfeeding duration (months)	
		Full breastfeeding	Total breastfeeding
Before 1950	94.1	2.3	13.0
1950-1954	92.3	2.5	12.6
1955-1959	87.4	1.9	11.9
1960-1964	87.0	1.8	11.9
1965-1969	82.5	1.5	12.0
1970+	74.6	1.1	10.1

*Adapted from (Butz and Da Vanzo, 1981)

A review on the First Malaysian Family Life Survey (MFLS-1) in 1976-1977 (n=4824) and the Second Malaysian Family Life Survey (MFLS-2) in 1988-1989 (n=5907) by (DaVanzo et al., 1994) found that there was a steady decline in breastfeeding rates until mid-1970's after which the rates increased. Malays maintained high rates of any breastfeeding over the entire period examined, with rates exceeding 95% every year. Breastfeeding rates for Chinese and Indians declined substantially until the mid1970's.

In a breastfeeding study involving 461 mothers in a rural area,Balakrishnan and Hussein (1977) reported that 95% mothers were breastfeeding at least once or twice a day and only 18% and 9% mothers were fully breastfeeding up to 3 and 6 months respectively. Solids were introduced as early as the first month by 26% mothers and before the end of the third month by 78% mothers.

It was reported that in a study of 100 mothers whose children were between the age of 6 months and 2½ years, only 49% mothers were fully or partially breastfeeding.

Breastfeeding was more common among the Malays (78%) followed by the Indians (55%) and Chinese (35%). The duration of breastfeeding was the longest among the Malays (50% at 6 months) compared to the Chinese (50% at 1½ months) (Chen, 1978).

In 1979, a study was conducted to compare infant feeding practices in Kenya (n=1999), Mexico (n=2208) and Malaysia (n=1942). It was found that the overall prevalence of breastfeeding among the three countries was lowest in Malaysia (Dimond and Ashworth, 1987). In Malaysia, among breastfed infants below 4 months of age, the percentages who were exclusively breastfed in the urban elite, urban poor and rural groups were 11%, 9% and 11% respectively. In this study, two-thirds of urban elite Malaysian mothers had discontinued breastfeeding by three months postpartum, a pattern similar among urban Malaysian mothers in 1970-1974 (Pathmanathan, 1978). The authors commented that the main areas of divergence between 'recommended' and actual breastfeeding practices are (1) the failure of over 50% of urban Mexican and Malaysian mothers to breastfeed for longer than 3 months and (2) the failure of almost all mothers to breastfeed exclusively for 4-6 months.

Another study conducted was based on the data of a large cohort of women who had delivered in the largest maternity hospital in the country (Kader, 1984). In the three time periods reviewed, 1980-1981 (n=29401), 1982 (n=7833) and 1983 (n=4380), 'breastfeeding only' rates had increased from 4.1% to 10.5% and 31.7% in the 1980-1981 to 1982 and 1983 respectively. In contrary, the incidence of mixed feeding declined from 94.4% in 1980-1981 to 87.6% in 1982 and 65.9% in 1983. The increase in 'breastfeeding only' was possibly attributed to the enforcement of the code of ethics of infant formula in Malaysia in early 1982. This study found no significant differences in breastfeeding among the three ethnic groups, socio-economic classes, maternal-age groups and parity status. The period 1980-1981 represented the period before the enforcement of the Code of Ethics against distribution of infant formula to the mothers. In 1982, infant formula samples were no longer freely available to the mothers compared to previous decades when hospitals were giving out infant formulas in hospitals

Awang and Salleh (2000) studied the data obtained from the Second Malaysian Family Life Survey carried out in 1988-1989 in Peninsular Malaysia on 1343 mothers who had their first live birth. It revealed that 82% of the women breastfed

and half of them only breastfed for less than 2 months. From birth, urban women breastfed for 3 months postpartum while rural women breastfed for 4 months. Among the three most common ethnic groups in Peninsular Malaysia, duration of breastfeeding was higher among the Malays compared to the Indians and Chinese with the median of 6, 3 and 1 month respectively.

Similarly, Chia (1992) who conducted a study on 126 mothers with children aged 6 months and 2 years reported that 61.1% mothers were breastfeeding (wholly and partially) and only 15.9% were wholly breastfeeding. 28.9% Malays were wholly breastfeeding compared to 10.5% Chinese. Rural and low income mothers were more likely to breastfeed than their counterparts.

Wan (1995), in his study of 258 mothers from rural areas found that the prevalence of any breastfeeding among children aged 15 months and younger was 61% (wholly and partially breastfeeding) and 33% were practising formula feeding. 53.3% mothers breastfed for 6 months and below and 22.3% breastfed for more than 12 months. Breastfeeding was more widely practiced by mothers of low educational group and lower household income. Alarmingly 6% (n=16) of the mothers fed their babies with sweetened condensed milk and 10 of them were as young as 0-3 months old. The infants were given solids as young as 0-3 months old.

Despite various attempts to increase the breastfeeding practices in Malaysia, Chye et al. (1997) reported that in a study of 500 mothers in 1995, 25% mothers practiced exclusive breastfeeding at 6 weeks, 49% were practicing supplementary breastfeeding and 26% were using the infant formula at 6 months postpartum only. Nevertheless, 88% of them thought that breast milk was best for their infants. In another study in Kuala Lumpur in 1995, 500 mothers were interviewed at 6 weeks postpartum. Exclusive breastfeeding was practiced among 25% of the mothers, 49% mixed feeding and 26% were giving infant formula. Among the mothers who had stopped breastfeeding, 31%, 24%, 10% and 30% of the mothers had correspondingly stopped breastfeeding in the first, second, third and fourth week postpartum. Among the mothers who had introduced formula, 89% started within the first four weeks. Similar to other studies in Malaysia, Chinese mothers (2%) were least likely to exclusively breastfeed compared to the Indians (15%) and Malays (36%) (Chye et al., 1997). Generally, the Chinese are better off in terms of socio-economic status and education levels.

In a retrospective study conducted on 64 mothers whom were asked to recall breastfeeding experiences of their youngest child, Yusof et al. (1995) reported that 95% of the mothers initiated breastfeeding where 61% mothers initiated breastfeeding within 1 hour after birth and another 5% within 4 hours after birth. 35% of the mothers started breastfeeding 3 days later and some were as late as 2 weeks after delivery. 97% of them planned to feed their consecutive child. It is interesting to note that 66% mothers discarded the colostrum which was regarded as dirty, not suitable for baby's health and can cause diseases. Among the breastfeeding mothers, 72% gave mixed feedings and only 28% gave exclusive breastmilk to their babies of less than 6 months old.

One study (Zulkifli, 1996) (n=566) conducted in a rural and of low socioeconomic community found that 97.3% mothers breastfed their babies but by 6 months 42.1% already stopped breastfeeding. Median age for starting weaning was 4 months and only 12.5% started after their baby was 6 months old.

The National Health and Morbidity Survey II in 1996 was the first national survey that used the indicators recommended by WHO for assessing breastfeeding indicators and provided baseline data for the country (Ministry of Health Malaysia, 1996). Prevalence of exclusive breastfeeding was 9.7% higher in the NHMS II compared to the NHMS III which was conducted ten years later. However, the prevalence of complementary breastfeeding remained almost the same over the ten year period.

The most recent nationwide breastfeeding data in Malaysia is from the National Health and Morbidity Survey III conducted in 2006 (Ministry of Health Malaysia, 2006). In the survey, 2167 respondents represented 804480 of the estimated population of children aged below 24 months in Malaysia. The overall prevalence of infants initiated breastfeeding within one hour of birth was 63.7% and prevalence of ever breastfed was 94.7%. Exclusive breastfeeding up to 4 months was 19.3%, predominant breastfeeding was 19.7% and complementary breastfeeding was 46.7%. Continued breastfeeding up to 2 years was 37.4% and was significantly higher among rural children. In the South East region, Malaysia was among the countries with the lowest prevalence of exclusive breastfeeding (Ministry of Health Malaysia, 2006). Programs implemented in the last ten years were effective in improving the prevalence of 'ever breastfeeding', 'timely initiation of breastfeeding' (being breastfed within first hour of life) and 'continued breastfeeding up to two

years' (Fatimah et al., 2010). All the above categories of breastfeeding showed an improvement compared to the NHMSII except for 'exclusive breastfeeding' below 6 months where the rate declined from 29.0% in 1996 to 14.5% in 2006.The prevalence of exclusive breastfeeding was highest among infants younger than two months (26.7%) followed by 11.7% and 6.1% in infants aged 2-3 months and 4-5 months respectively. The 2006 survey showed a significant increase in the prevalence of ever breastfeeding among urban children compared to the 1996 survey of NHMSII.

In a study of 220 mothers, 32.8% mothers exclusively breastfed for 6 months while 14.5% practiced mixed infant feeding. 71% practiced breastfeeding because "breastmilk is the best"(Tan, 2009b) while in his other study which investigated the factors associated with non-exclusive breastfeeding among 498 mothers near Kuala Lumpur, the prevalence of exclusive breastfeeding at 4 weeks postpartum was 45.8% (Tan, 2009b).

In his more recent study, Amin et al. (2011) studied the factors associated with exclusive breastfeeding among 682 mother-infant pairs in Peninsular Malaysia. The prevalence of exclusive breastfeeding of infants aged between one and six months was 43.1%. Amin et al. (2011) conducted work related determinants of breastfeeding discontinuation (n=290) found that 54% from 149 mothers breastfed less than 3 months, 35% discontinued between 3-6 months and only 12% discontinued after 6 months. More non-Malay mothers discontinued breastfeeding (76%) compared to Malay mothers (43%) (Amin et al., 2011).

Predictors of breastfeeding in Malaysia

Previous studies in Malaysia showed that women of Malay ethnicity more commonly breastfed their babies than the Chinese and Indians. Chinese mothers in Malaysia were the least likely to breastfeed (Amin et al., 2011, Chia, 1992, Tan, 2009b). Teoh (1975) found lower breastfeeding rates among the Chinese in a rural area in Malaysia where only 58% Chinese who breastfed their infants compared to 92.5% Malays. 72.8% of the Malays who breastfed continued for more than 6 months. Chinese mothers were least likely to practice exclusive breastfeeding (2%) compared to the Indians (15%) and Malays (36%) (Chye et al., 1997). (Pathmanathan, 1978) found that cultural factors related to the different ethnic

groups have a strong influence on breastfeeding. Almost half of the urban Malays and Indians and two-third of the Chinese in his study had stopped breastfeeding before the third month. Breastfeeding among the Malays changed little but sharp decline took place among the Chinese and Indians (Notzon, 1984). Awang and Salleh (2000) mentioned that the longer breastfeeding duration in his study could be due to the fact that Malays are Muslims and that Islam encourages mothers to breastfeed until 2 years of life.

Studies conducted in the 1970s showed that women of lower socio-economic status were more likely to breastfeed than women of higher socio-economic status. However, the reverse is the norm in studies conducted in the 1980s. Teoh (1975) and Chen (1978) reported that 90.4% mothers from the poorest income group breastfed compared to other income groups and more lower income mothers tended to breastfeed than upper income mothers while (Kader, 1984) found that breastfeeding was more common among the women of higher socio-economic status. Nevertheless, Chia (1992) reported that the profile of a breastfeeding mother was from the lower socio-economic status. Similarly, another study also reported that mothers with higher education level, employed and with higher household income were less likely to breastfeed (Tan, 2009b, Wan, 1995).

While Chen (1978) reported that there is no significant difference in the duration of breastfeeding between working mothers and housewives, other studies found that the odds of practicing breastfeeding was higher among unemployed mothers (Fatimah et al., 2008, Amin et al., 2011).

Before the 1980's more educated women were significantly less likely to initiate breastfeeding but the reverse occurred after 1982 among the Malays and Chinese (DaVanzo et al., 1994). However, it has also been reported that mother's educational status was not an important factor which influenced the mother to breastfeed (Chia, 1992). It was hypothesized that the increase in breastfeeding initiation in Malaysia are not due to reductions in the 'costs' of breastfeeding but rather to increases in the perceived benefits (DaVanzo et al., 1994).

Exclusive breastfeeding was positively associated with rural residence (Amin et al., 2011, Chia, 1992). Notzon (1984) reported that declines in breastfeeding rates are largest for the most modern groups. The relative decline in nursing practices appears to be greatest among the groups most exposed to modern influences. In

Malaysia, the greatest influences have been in urban areas, among the educated population and in the wealthier classes. According to Rogers et al. (1997), in developing countries, women residing in rural areas are more likely to breastfeed than their counterparts. Therefore, breastfeeding is perceived as a sign of lesser social status and old fashioned by women of better and higher social class who usually bottle-feed to become 'modern' and 'westernized' (Dennis, 2002).

Anderson (1984) had looked on the effect of health programs on breastfeeding and child mortality in Peninsular Malaysia. The data collected in the Malaysian Family Life Survey in 1976 was used in this study involving 1262 households within Peninsular Malaysia. The availability of family planning clinics has no significant effect on breastfeeding but the presence of modern sanitation has a significantly negative effect and the distance to hospital has a slightly positive effect on the length of breastfeeding. Breastfeeding durations decline with parental schooling and urban location but increase with mother's age. Anderson (1984) commented that if breastfeeding rate has been declining in low-income countries as they develop, the culprit may be the process of economic development itself, which increases the value of a woman's time and raises family income. The decline in breastfeeding, however, does not necessarily imply a significant increase in infant mortality if good substitutes for breastfeeding exist.

Other predictors of breastfeeding from Malaysian studies are as in table 2.5 below

Table 2.5: Other predictors of breastfeeding in Malaysia

Factors	**References**
breastfeeding intention during antenatal	(Fatimah et al., 2008, Chye et al., 1997)
initiated breastfeeding within first hour after delivery	(Fatimah et al., 2008)
mothers who believed that giving plain water can cause harm to babies	(Fatimah et al., 2008)
non-smoking mothers	(Amin et al., 2011).
multiparous mothers	(Amin et al., 2011).
term infants	(Amin et al., 2011)
mothers with husbands who support breastfeeding	(Amin et al., 2011)
mothers who practice bed-sharing	(Amin et al., 2011)
Older age group	(Chye et al., 1997)
Female infants	(Chye et al., 1997, Tan, 2009b)

In one study it was suggested that important determinants of breastfeeding duration in Malaysia include ethnicity, age, employment status and husband's occupation. Duration of breastfeeding were longer among Malays (versus Chinese and Indians), younger mothers, unpaid family workers [rural women who assist their families in rubber estates, paddy field or small scale business (versus not working mothers)], mothers whose husband's had agricultural job (versus professionals and manual jobs) (Awang and Salleh, 2000). Interestingly, it was also reported that women with male infants were 1.98 times more likely not to practice exclusive breastfeeding compared to females (Tan, 2009b).

It was suggested that Malaysian women had a positive attitude towards breastfeeding but work place and short maternity leave had a negative impact on breastfeeding (Tan, 2009b). This was confirmed by Amin et al. (2011) who conducted a study on work related determinants of breastfeeding discontinuation and found that having maternity leave of more than 2 months was one of the risk factors for breastfeeding discontinuation. Working mothers may discontinue breastfeeding earlier knowing that they cannot continue breastfeeding when they returned to work. Not having breastfeeding facilities at work place was another risk factor. Mothers who work in workplaces without refrigerators were more likely to discontinue breastfeeding. More mothers who work in the private sector had discontinued breastfeeding than those who worked with the government.

Predictors of non-exclusive breastfeeding among 498 mothers in a district near Kuala Lumpur was reported to be of Indian ethnicity (OR = 4.06), working mother (OR = 3.55), mother from high household income (OR =1.90), mother who smokes (OR = 7.27), primiparous (OR = 1.97), infant not sharing a bed with mother (OR = 1.75) and infant born prematurely (OR = 7.69) (Tan, 2009b).

Predictive factors for formula feeding include having breastfeeding difficulties, less than 9 years of schooling and of Chinese descent. Employment, short duration of hospital stay, influence of family members and friends, and socio-demographic factors played important roles in the choice of infant feeding among women in this study (Chye et al., 1997).

2.1.2.3 Reasons for breastfeeding discontinuation

Results from various breastfeeding studies reported that reasons for breastfeeding discontinuation in Malaysia include factors as listed in Table 2.6 below.

Table 2.6: Reasons for breastfeeding discontinuation and mixed feeding in Malaysia

	Reasons	**References**
1.	No milk	(Balakrishnan and Hussein, 1977, Koh, 1980)
2.	Formula feeding is better	(Balakrishnan and Hussein, 1977)
3.	Not enough milk	(Balakrishnan and Hussein, 1977, Chye et al., 1997, Dimond and Ashworth, 1987, Teoh, 1975, Chen, 1978, Koh, 1980, Tan, 2009b, Teh, 2000, Yusof et al., 1995)
4.	Working mother	(Balakrishnan and Hussein, 1977, Chen, 1978, Koh, 1980, Tan, 2009b, Teh, 2000, Yusof et al., 1995)
5.	Problems related to the breast and nipples	(Chye et al., 1997, Teh, 2000)
6.	Hospitalization of the infant	(Chen, 1978)
7.	Maternal tiredness and illnesses	(Chye et al., 1997, Chia, 1992, Chen, 1978)
8.	Babies prefer bottles	(Teoh, 1975)
9.	Poor lactation	(Chia, 1992)
10.	Inconvenience	(Chia, 1992, Teh, 2000)
11.	Baby dislikes breastfeeding	(Koh, 1980)

Results from these studies showed that not enough milk was the most frequent reason given by mothers for discontinuation of breastfeeding followed by mothers returning to work after 2-3 months of delivery or at the end of the maternity leave. In one study, the most frequent reason for introducing ‘other milks’ (either to supplement or replace breastmilk) was ‘baby hungry’ or ‘insufficient milk’. It is worth noting that poor urban and rural mothers gave this reason more often than urban elite. It was found that factors that constrain exclusive breastfeeding are likely to differ from those that constrain duration. He argued that it would be wrong to assume that an intervention that successfully extends the duration of breastfeeding

will simultaneously increase the prevalence of exclusive breastfeeding (Dimond and Ashworth, 1987).

In a study among 500 mothers, 39% mothers who had experienced breastfeeding difficulties reported that insufficient milk supply was the most common reason (71%) followed by problems related to the breasts and nipples (11%), problems related to infants (9%) and maternal tiredness and illnesses (9%) (Chye et al., 1997). Chen (1978) reported that the main reasons for stopping breastfeeding were inadequate lactation (67%), work (15%) and the hospitalization of the infant (5%). Main reasons for formula feeding include convenience (26%), mother's illness or weakness (23%) and poor lactation (20%).

It had been reported that reasons for not breastfeeding include poor lactation (46.2%), mother's illness or weakness (19.8%), inconvenience (18.9%) but the remainder 15.1% did not give any reason for not breastfeeding (Chia, 1992). It is possible that these mothers did not breastfeed without any reason. In another study, reasons for breastfeeding include convenience, cheapness, traditional advice and baby's preference. In this study, it was noted that the Chinese, even in rural areas, breastfeed less. Mothers who were on full-time occupation and secondary level education were also less likely to breastfeed (Teoh, 1975).

In a report, it was mentioned that most of the babies in the 1970s, were put to the breast more than 24 hours after delivery and that babies were given bottle-feeding before the initiation of breastfeeding. Consequently, 70% of these mothers breastfed partially resulting in lactation failure in a short time (51.6% stopped breastfeeding by one month). Some of the traditional hospital practices have adverse effects on breastfeeding and suggested for modification in hospital practices (Chen, 1980). These include adopting minimal bottle-feeding policy, avoiding promotion of unwanted commercial infant foods via the distribution of samples, brochures, calendars and display of posters, practical demonstrations by those who had successfully breastfed their babies, early baby to breast contact and 'rooming-in'. In summary, it was concluded that 'hospitalization induced lactation failure' should be prevented.

Before the 1980's, little effort had been made by the Malaysian government to promote breastfeeding. Koh (1980) reported that there were no active, co-ordinated efforts in Sarawak to encourage breastfeeding. In contrast with the current scenario,

the maternal and child health clinics in Kuching, Sarawak had posters of milk companies on the wall. Consequently, only 67% mothers initiated breastfeeding and only 25% and 10% breastfed for longer than one month and 3 months respectively. According to Koh (1980), lack of knowledge among mothers in his study was proven by the reasons they gave for not breastfeeding. 40% mothers said that they had “no milk” and 30% said that “baby not liking it”. Interestingly, the mothers even believed that they had stop producing milk after the one month confinement (seclusion). In this thesis, confinement refers to the period after childbirth up until the time when the mother resumes the usual routines she was undertaking before childbirth.

However, lack of breastfeeding knowledge was not the problem in late 1990’s. One small study on Chinese mothers only (n=30) highlighted the problem that although mothers had good breastfeeding knowledge, they were actually not confident as they felt they did not get adequate breastfeeding assistance in the postpartum wards from the nurses. As usual, insufficient breastmilk is the most common reason for breastfeeding discontinuation other than inconvenience, returning to work and breast engorgement (Teh, 2000).

In one study, reasons for mixed feeding were working outside home (48%) and insufficient milk (36%) and that incidence of mixed feeding was more prevalent in the higher income group (Yusof et al., 1995). Insufficient breastmilk was the main reason for infant formula feeding in another study (48%) followed by employment (29%) (Tan, 2009b). In another study, reasons for starting weaning early were insufficient breastmilk, their babies were always hungry and advice from health staff to wean at 4-6 months. There were a substantial number of mothers who ceased breastfeeding once weaning was started. Three most popular weaning foods were ‘Nestum’ (commercialised baby food), rice porridge and wheat porridge (Zulkifli, 1996).

In summary, breastfeeding in Malaysia has increased in prevalence in recent decades. There has been an increase initiation of breastfeeding, timely initiation of breastfeeding and prevalence of predominant breastfeeding. However, the prevalence of exclusive breastfeeding and breastfeeding up to 2 years of age was relatively low as compared to WHO recommendations. Working mothers is one of the barriers for breastfeeding in Malaysia. Rural mothers showed longer breastfeeding duration compared to urban mothers albeit the increasing trend of higher breastfeeding rates among more educated mothers. Among the three ethnic

groups in Malaysia, breastfeeding rates were highest among the Malays, followed by the Indians and the Chinese. Reasons for breastfeeding cessation were similar with other countries.

2.1.3 Predictors of Initiation and duration of breastfeeding

Several factors associated with breastfeeding initiation and duration include age (older mothers are more likely to choose to breastfeed), education level (mothers with higher educational attainment are more likely to breastfeed and the longer the duration of breastfeeding), marital status (married women were significantly more likely to initiate breastfeeding than single women), husband/partner's preference (a partner who is supportive of breastfeeding plays an important role in the mother's decision to breastfeed), social culture (loss of traditional culture, increasing urbanisation, transition from extended to nuclear families and increased interest in Western lifestyles decreased the prevalence of breastfeeding) and social class (higher socioeconomic status have been positively correlated with breastfeeding initiation and duration rates). Dummy or pacifier use have been negatively associated with both the initiation and duration of breastfeeding (Scott and Binns, 1999).

In general there is a strong and consistent positive association between maternal age and level of education with breastfeeding initiation an duration. In a review of the literature of factors associated with the initiation and duration of breastfeeding, Scott and Binns (1999) found that in recent studies employing multivariate analysis, there was a strong and consistent association with demographic factors such as maternal age and level of education and a less consistent association with factors such as marital and socioeconomic status.

In a sample of 500 Malaysian women, it was reported that mothers older than 27 years old were 1.48 times more likely to be exclusively breastfeeding than younger mothers (Chye et al., 1997). However, age and education were not positively correlated with breastfeeding in other study (Chezem et al., 1997). Mother's education level and household income were reported to be significantly different between the breastfeeding and formula feeding group (Nishioka et al., 2011). Maternal age, level of education, ethnic background and family income has been repeatedly identified as independent determinants of breastfeeding initiation in

populations where the proportions of women initiating breastfeeding have been 80% or less (Scott et al., 2006a).

Some studies found that primiparous women are more likely to initiate breastfeeding while multiparous women continue breastfeeding for longer. One commonly reported significant predictor of successful breastfeeding is parity and previous breastfeeding experience. First time mothers are more likely to have problems with breastfeeding compared to women who have previously breastfed. However, even women with previous breastfeeding experience reported problems of 'perceived insufficient breastmilk' (Gatti, 2008). Bogen et al. (2010) found that there was a strong association between parity and prior breastfeeding experience with breastfeeding intention. The negative relationship between multiparity and breastfeeding may be based on perceived convenience of bottle-feeding when coping with older children or previous unsuccessful breastfeeding (Bick et al., 1998)

Women who had Caesarean section were less likely to initiate breastfeeding. There was a negative association between infant health problem and the initiation and duration of breastfeeding. Rooming-in, early mother-infant contact, demand feeding, staff practices and breastfeeding guidance, social support. Scott et al. (2006a) also found that biomedical factors such as parity, method of delivery and baby's health are stronger determinants of exclusive breastfeeding at hospital discharge than psychosocial factors. Women whose infants were admitted to special care nursery or who had caesarean deliveries were less likely to be exclusively breastfeeding at discharge. However, this association was less consistent in multivariate studies.

Social norms significantly predict breastfeeding initiation. The perception that breastfeeding is the best but artificial milk is good enough can have a significant influence on infant feeding. Some formula feeding mothers believed that formula feeding provide the same health benefits as breastfeeding and has advantage in terms of convenience and let others help. Some believed that breastfeeding is for those 'one of those perfect, stay-at-home moms who doesn't have to work'. A review found that women with certain maternal personality traits such as being reserved, sceptical or less likely to try new things and lower self-concept are less likely to initiate breastfeeding (Atchan et al., 2011).

A more recent literature (Brodribb et al., 2007) divided the breastfeeding predictors into several components namely mother related reasons, health effect for the

infants, moral and family influences and advice from others. Women who decide to breastfeed normally give infant related reasons particularly the benefits to infant's health while mothers who decide to formula-feed from birth tend to give mother centred reasons such as disliking breastfeeding and feeling tied-down with breastfeeding. The most common reasons mothers gave for deciding to breastfeed were that *breastmilk is better for the baby* and that *breastfeeding enhances my baby's immunity.* Women providing mother related reasons were more likely to have made the decision of infant feed before becoming pregnant and women who gave reasons related to advice from others were more likely to be younger. Women who obtained information about breastfeeding prior to pregnancy were more likely to give infant related reasons and advice from others. This study highlighted the importance of the advice by health professionals and family members in the decision processes of younger breastfeeding women.

Prenatal breastfeeding intention is another important predictor of breastfeeding initiation. In general the earlier the breastfeeding decision is made, the longer the duration. Most pregnant women have made the decision how they will feed their infant by the third trimester and approximately 50% have made this decision prior to conception (Lau, 2002). A study on 2690 low income, inner-city women in Philadelphia showed that maternal education and marital status had significant associations with breastfeeding intentions. Higher educational level and married women were more likely to intend to breastfeed than their counterparts. (Lee et al., 2005). Unmarried women were less likely to initiate breastfeeding (Bick et al., 1998).

A review of the western literature (Atchan et al., 2011) had identified a range of reasons by women for their decision not to breastfeed. These include convenience, dislike of breastfeeding act, embarrassment of feeding in public, personal health concerns, fear of pain, concerns about ability to produce enough milk, partner involvement/approval, early return to work, previous experience, preference and comparability or superiority of infant formula. Most of the above reasons are mother-centred.

Although formula feeding is costly, it did not matter to the formula-feeding mothers. Mothers in both groups tended to believe that community approved more of breastfeeding than formula feeding but this was not an important consideration in their choice of feeding method. Perception of the support of family members tended to be similar for both methods but in the breastfeeding group, families were viewed

as relatively more supportive of breastfeeding compared to those in the formula feeding group. Four recurring themes as explanations for why these mothers chose not to breastfeed were demands of work or school, life circumstances, the non-support of significant others and embarrassment.

Numerous studies found that intentions before the childbirth are closely linked to mothers' actual feeding practices (Atchan et al., 2011). The earlier the decision is made to breastfeed, the greater the likelihood of initiation and longer the duration (Dennis, 2002). Early decision indicates a stronger desire and determination to breastfeed and thus the mother is more capable of overcoming difficulties and to continue breastfeeding. Entwisle et al. (1982) found that most women do not change their minds about breastfeeding after birth, although they may alter their plans regarding duration. In the review, it was also found that health professionals provide support when the women is breastfeeding but not in the decision process. Their advice may also be influenced by their personal attitudes and experiences.

Intended duration was the strongest predictor of the actual duration of breastfeeding. Anticipated duration of lactation is strongly correlated with actual duration. In one study (Chezem et al., 1997), no subject planned to breastfeed for less than three weeks but 13% of subjects weaned their infants in the first 3 weeks after birth. However, 42% of subjects continued breastfeeding beyond 6 months although only 28% planned to do so.

Infant feeding intention was a strong predictor of infant feeding status (Bogen et al., 2010). However,Otsuka et al. (2008) found that only 40.4% women were exclusively breastfeeding at 4 weeks postpartum although 82% of them intended to. Mothers were significantly more likely to stop breastfeeding by 4 weeks postpartum if they were older, multiparous, intended not to exclusively breastfeeding and had lower score of Breastfeeding Self-efficacy Scale. A total of 79 out of 108 mothers cited perceived insufficient milk as the main reason for their change of infant feeding method (Otsuka et al., 2008).

The influence of socio-demographic factors on breastfeeding duration is well studied in the literature. According to O'Brien et al. (2008) these factors are not easily modified and therefore offer little opportunity in increasing breastfeeding duration. Identifying factors which are open to modification such as of psychological characteristic should become the new focus among research in the factors

influencing the duration of breastfeeding. According to Dennis (2002), although breastfeeding is positively related to socioeconomic status in most developed countries, there is an inverse relationship in developing countries. Researchers have shown that higher income women in these countries may perceive breastfeeding as old-fashioned and a sign of lesser social status. Such women bottle-feed to be modern and westernized (Rogers et al., 1997).

Stressful personal home situations were also presented as barriers to breastfeeding which include problems with relationship at home, smoking and living in a crowded area, no time and privacy for breastfeeding. Some mothers commented that “It is easy for women to breastfeed if they are financially secure and don’t have to work”. Embarrassment of breastfeeding in public places was one of the main reasons for not breastfeeding.

Seven psychological factors which were significantly associated with the duration of breastfeeding in his study were anxiety, the timing of the infant feeding decision, breastfeeding expectations, planned breastfeeding duration, breastfeeding self-efficacy, dispositional optimism and faith in breastmilk. The higher the score is on ‘dispositional optimism’, the longer the woman breastfeed. Similarly, the probability of continuing to fully breastfeed increase by 36% for every increase in ‘faith in breastmilk’ score (O’Brien et al., 2008).

Lau (2002) reported that individual variables associated with successful breastfeeding include attitudes of mothers, personality traits and life experience that affecting breastfeeding while family variables include family organisation, family position, value, belief and personality. O’Brien et al. (2008) suggested that women who possess the right psychological make-up for breastfeeding may be capable of overcoming the disadvantages posed by socio-demographic factors. According to Bottorff (1990) ‘a mother will not know the reality of breastfeeding until she begins to breastfeed and it is only in the execution of the action that mother’s inner strength and intentions are put to the test’.

Women who breastfeed tended to have more positive attitudes towards breastfeeding than women who formula fed exclusively. Formula may simply be accepted as a ‘good enough’ substitute. Some of the low income women suggested that more privileged women than themselves can more easily afford to do it. Beliefs in breastfeeding benefits to the baby and a perception that community’s social norm

are that good mothers should breastfeed may elicit tensions. Many breastfeeding mothers manage to maintain and enjoy breastfeeding and find it a highly rewarding experience.

Lawson and Tulloch (1995) found no relationship between commitment and confidence as a predictor of breastfeeding duration. In one study, breastfeeding was initiated by 78% of 68 women and that women's confidence in her ability to breastfeed was not correlated with breastfeeding duration (Chezem et al., 1997).

Return to employment is one of the major reasons for early cessation of breastfeeding. Working mothers may discontinue breastfeeding earlier knowing that they cannot continue breastfeeding when they returned to work. Inadequate breastfeeding facilities at workplace were a risk for breastfeeding discontinuation (Amin et al., 2011). Working in private sector was also associated with breastfeeding discontinuation.

In a multi-ethnic population, ethnicity is a risk factor for breastfeeding discontinuation. A recent study among employed mothers in a district in Kuala Lumpur, Malaysia reported the risk of breastfeeding discontinuation were higher among the Chinese and Indians (Amin et al., 2011).

A Swedish study of 2666 mothers looked at factors associated with breastfeeding at 1 month of age. The multivariate analysis showed that use of pacifier, breastfeeding problems, breastfeeding support group, maternal smoking and paternal smoking were significant determinants for non-successful breastfeeding. 74% of the mothers were exclusively breastfeeding at 1 week and 27% reported having breastfeeding problems of all sorts such as sore nipples (25.3%), poor sucking technique (13.7%), perceived insufficient milk supply (8.9%), breast engorgement (8.3%) and difficulty in starting up breastfeeding (4.5%) and other breastfeeding problems (4.5%). It was also reported that mothers who breastfeed less frequently were more likely to develop breastfeeding problems.

According to Dennis (2002) most mothers wean before the recommended 6 months because of perceived difficulties with breastfeeding rather than due to maternal choice. Women least likely to breastfeed are those who are young, have a low income, belong to an ethnic minority, are unsupported, in full time employment, decided to breastfeed during or in late pregnancy, have negative attitudes toward

breastfeeding and have low confidence in their ability to breastfeed. Support from the mother's partner or a non-professional greatly increases the likelihood of positive behaviours. The top five breastfeeding problems reported in the first week postpartum were sleepy infant (85%), sore nipples (66%), leaking breasts (59%), infant spitting up (49%) and the mother feeling sad (44%) (Kearney et al., 1990). Additionally, Dennis et al. (2002) found that maternal issues involved are sleep deprivation (60%), finding time for self (52%), feeling sad and crying (45%) and perceptions of being isolated and tied down (43%).

Mother's perception of convenience is different between one and another. Some feel that breastfeeding is convenient because they don't have to prepare the feeding or sterilize the bottles and some bottle-feeding mother's say it is convenient for having more time for themselves or while being out occasionally.

McNatt and Freston (1992) found that breastfeeding women who considered themselves to be successful were positive thinkers and problem solvers who were determined to succeed and perceived difficulties as 'normal' whereas the women who were not successful were self-doubting, anxious, rigid in their breastfeeding practices, focused on the negative aspects of breastfeeding and more likely to discontinue when confronted with difficulties.

Papinczak and Turner (2000) found that greater scores for depression 3 months after giving birth was correlated to shorter breastfeeding duration in their study of 159 women in Brisbane, Australia. Breastfeeding difficulties may predispose to early weaning and thus lead to anxiety and/or depression in susceptible mothers.

Guttman and Zimmerman (2000) reported the 'views on breastfeeding' by 154 mothers from an urban low-income multi-ethnic population. Findings indicate that overall, mothers in both group tended to believe breastfeeding offered greater health and psychological benefits than formula, including the benefit of creating a special bond between mother and infant. Attributes that mattered most to the formula-feeding mothers were 'conveniences', 'allowed more for others to help with the baby' and 'enjoyment for the mother'.

A prospective study of 649 women interviewed during the immediate postpartum period about their decision to breast or bottle feed found at 1 year follow up that having a supportive partner and a mother who had breastfed were associated with

longer breastfeeding duration (Jones, 1986). Other factors which influenced infant feeding choice include mother's knowledge and attitudes and husband's support (Kong and Lee, 2004).

"Insufficient breastmilk" was the most common reason for discontinuation of breastfeeding. However, this was not the case among women in one study (Ertem et al., 2001). In this study, 2 predictors of breastfeeding discontinuation were mother's lack of confidence about continuing breastfeeding and the belief that baby enjoys bottle-feeding. This study highlighted that mothers agreed to the cues of the newborn and that the newborn's behaviour may shape the mother's perception of which type of feed is preferred by the baby. This indicate the role of the infant as an active participant in the outcome of breastfeeding (Ertem et al., 2001). Lack of breastfeeding confidence is associated with maternal perceptions of insufficient breastmilk.(McCarter-Spaulding and Horowitz, 2007a).

Breastfeeding was initiated by 63% out of 906 mothers in Birmingham, England but 40% of them stopped breastfeeding within 3 months of delivery and one third of these mothers never attempted breastfeeding (Bick et al., 1998). Predictors of early cessation in this study were return to work within 3 months of birth, regular childcare support from other female relatives and high score of the Edinburgh Postpartum Depression Scale. Non-initiation of breastfeeding was predicted by multiparity, general anaesthetic and unmarried status (Bick et al., 1998).

Prior exposure to breastfeeding is another influential factor of infant's feeding choice. Women who breastfeed were more likely to have been breastfed themselves, been mainly advised to breastfeed by family and friends and had infrequent contact with their relatives (Hally et al., 1984). Negative advice based on relatives' own experience is likely and this highlight the influence of a woman's social network on breastfeeding practices.

Scott et al. (2006a) reported that in both Perth Infant Feeding Study 1 and 2, the strongest independent predictor of any breastfeeding at discharge was the father's infant feeding attitude as perceived by the mother. Mothers with the perceptions that their partner prefers breastfeeding are more likely to breastfeed compared to their counterparts.

However, according to Freed et al. (1993), “a large percentage of women incorrectly predicted negative responses from fathers, raising the possibility that the father’s negative influence on breastfeeding is based on the mother’s inaccurate perception”. If the mother-to-be thought that her partner had a negative attitude towards breastfeeding, she would be more likely to plan to bottle-feed, regardless of the accuracy of this judgement (Bar-Yam and Darby, 1997).

Fathers are always expected to support their wives’ breastfeeding without themselves having sufficient knowledge and understanding of how breastfeeding works and how they can support it. They recommended that fathers be included in breastfeeding education and that the time spent discussing infant nutrition in child birth classes be expanded to “allow time for explanation of the supportive role families can play for the breastfeeding mother” (Freed, 1992). Fathers were more important than doctors, nurses or lactation consultants in the mother’s decision to initiate breastfeeding (Beske and Garvis, 1982). However, Guttman and Zimmerman (2000) found that partner’s preference of feeding method was not rated as important in influencing the mother’s decision among the women in his study.

The first feeding usually occurs within the first 24 hours. This is an important learning time for both mother and baby and many mothers require assistance with the first feeding**. ‘**Lack of support from a significant other’ was the most significant variable identified for those who chose to bottle feed (Freed, 1992). The mother’s perception on her partner’s support is more important than the real support received by the mother. Higher levels of social support, multiparity and previous breastfeeding experience were positively associated with full breastfeeding continuation up to six months (Clifford et al., 2006). Father’s support of the mother in breastfeeding beyond 5 months was second only to the encouragement provided by the baby (Beske and Garvis, 1982).

Fathers sometimes show signs of jealousy toward the breastfeeding pair, either toward the infants who has taken away much of his partner’s time and affection and or toward the new mother who can offer the baby nourishment and calm the crying baby in a way that he will never be able to duplicate (Bar-Yam and Darby, 1997).

Another Canadian sample of 780 women showed that significant risk factors for early breastfeeding cessation included younger maternal age, obesity prior to pregnancy, lower education of the mother, working full time, history of depression,

depression or anxiety during pregnancy, poor social support and smoking during pregnancy (Kehler et al., 2009). Younger mothers with lower education levels may be less informed about the benefits of breastfeeding (Kehler et al., 2009). Residing with a smoker is a 'new' risk factor for breastfeeding cessation. Mothers who resided in a smoking household is 55% less likely to be fully breastfeeding at 1 week (Clifford et al., 2006).

Some studies highlighted that breastfeeding can be easily influenced by 'significant others' such as partners, siblings and grandmothers (MacGregor and Hughes, 2010). These significant others were commonly blamed for the bottle-feeding culture, being brought up in a bottle-feeding culture and portray of bottle-feeding as an ideal infant feeding method. Many studies have found that the most influential family members were the mother's mother and the infant's father. A woman's partner is a strong influence in her infant feeding decision. It can cause women to change their behaviour to match their partner's belief rather than their original breastfeeding intentions (Rempel and Rempel, 2004). These significant others were commonly blamed for the bottle-feeding culture. Being brought up in a bottle-feeding culture and portray of bottle-feeding as an ideal infant feeding method. Therefore it is important to educate these influential people about breastfeeding.

In summary, there are several risk factors that are associated with breastfeeding initiation, duration and early cessation. These factors include maternal age, education level, marital status, husband/partner preference, social culture/support, socio-economic status, ethnic background, parity, previous breastfeeding experience, mode of delivery, working status, husband/partner support, use of pacifier, maternal and paternal smoking status and psychological factors (perceived difficulties of breastfeeding, lack of confidence, history of depression, depression and anxiety during pregnancy).

2.2 POSTPARTUM DEPRESSION

By the year 2020, WHO projected that depression will become the second cause of global disease burden (WHO, 2001). Depression may be the most frequent psychiatric disorder seen after childbirth (Brockington, 2004). Postpartum psychiatric illness has been reported as the leading cause of maternal death in Australia (Brockington, 2004).

Postpartum depression can occur at any time after delivery up to 1 year postpartum. Factors such as culture, socioeconomic status, genetics, ethnicity and reporting style may contribute to the diversity of reported prevalence of 0.5% to 60% worldwide (Halbreich and Karkun, 2006b). Postpartum depression is caused by combination of many factors – biological, psychosocial, genetics and cultural factors. In real life, postpartum depression is caused by heterogeneous bio-psycho-socio-cultural factors (Halbreich, 2005b).

Effective action to deal with postpartum depression is not only because of the maternal morbidity and mortality but also the pervasive effects on the family (Brockington, 2004). Negative implications of antenatal and postpartum depression during infancy and throughout the childhood days of the newborn were evidenced in results of many studies throughout the world (Beck, 1998b). A meta-analysis of 9 studies revealed that postpartum depression has a moderate to large adverse effect on maternal-infant interaction during the first year after delivery (Beck, 1995b). Postpartum depression may have a deleterious effect on the woman's social and personal adjustment, the marital relationship and the mother infant interaction. Postpartum depression is of particular concern because of its possible detrimental long-term effects. Postpartum depression can cause disturbed mother-infant relationship and significant effect on cognitive and emotional development of children (Beck, 1998b). In untreated postpartum depression, the episode can be the precursor of recurrent depression for the mother. Ongoing depression can contribute to emotional, behavioural, cognitive and interpersonal problems later in life of her children (Jacobsen, 1999). Infants of depressed mothers tend to be more fussier, more discontent and un-avoidant (Field, 1995). Since postpartum depression has a significant impact on breastfeeding, infants of depressed mothers are less likely to have the benefits of prolonged breastfeeding nutritionally and emotionally.

Postpartum depression is common among mothers in the developed countries and is being increasingly reported as a significant problem in the postpartum period among women in developing countries. Although Ohara and Swain (1996) believed that the prevalence of postpartum depression is considered to be 10-15%, Halbreich and Karkun (2006b) who conducted a review from 143 studies reporting prevalence in 40 countries believed that the widely cited prevalence of 10-15% is not representative of the actual global preference and magnitude of the problem. One study which involved 11 centres showed that postpartum depression was most frequent in India (32%), Korea (36%), Guyana (57%) and Taiwan (61%) (Affonso et al., 2000).

The variability in reported postpartum depression might be due to cross-cultural variables, reporting style, differences in perception of mental health and its stigma, differences in socio-economic environment (poverty, levels of social support or its perception, nutrition, stress) and biological variability factors (Halbreich and Karkun, 2006b). According to Bick et al. (1998), although most postpartum screening studies to date have been conducted within the first three months of the birth, estimates of prevalence suggest that rates of depression may remain high for several more months.

Many studies on postpartum depression used the term depressive symptoms or symptomatology in referring to the group of women in the higher cut-off points. Measures of postpartum depression include the Edinburgh Postpartum Depression Scale (Cox et al., 1987b), Beck Depression Inventory (Beck et al., 1961), Centre for Epidemiological studies-D Scale (Radloff, 1977), Zung's Self Rating Depression Scale (Zung, 1965) and Hamilton Rating Scale for Depression (Hamilton, 1960).

Cox et al. (1993) who compared prevalence of depression between postpartum women and women from general population found that there was no significant difference in the point prevalence and period prevalence at 6 months between the two groups. However, a threefold higher rate of onset of depression was found within five weeks of childbirth. According to them, it is most likely that the life event of childbirth and the immediate impact of a new family member is a specific stress which lowers self-esteem and leads to the development of a depressive disorder.

Buist et al. (2008b) conducted a study based on the data collected in the Australian Beyondblue National Postpartum Depression Programme which involved women

who gave birth in 2002-2004. A total of 12 361 women from 43 health centres across Australia were assessed for the postpartum mental health status at 6-8 weeks postpartum. 15.5% women had EPDS scores of above 9 (moderate likelihood of depression) and 7.5% scored above 12 (high likelihood of depression). The highest percentage of women scoring above 12 were in Queensland and South Australia (both 10.2%) while Western Australia had the lowest point prevalence (5.6%). Interestingly, women recruited from the private health services in Western Australia had a significantly lower EPDS scores than those from the public health services. The low rate of elevated EPDS scores in the private sector may be due to the better socioeconomic and educational status of these mothers.

Brown and Lumley (1998) reported that depression was much higher when women are sampled later in the postpartum year. Grace et al. (2001) highlighted that reasons for incorrectly reported low rates of depression in her study could be due to the effects of recall, the stigma of a socially unacceptable reaction or previous post-natal low mood being expressed as somatic symptoms.

It is possible that self-report instrument underestimate the rate of depression because of women's reluctance in endorsing negative mood symptoms. The distress that is often described in symptoms of depression in Western countries is expressed as somatic complaints in non-Western countries. Bashiri (1999) argued that social support received for only 1 month traditionally may not be sufficient to counterbalance the stresses of the increasingly westernized women in Japan. There is also a danger of cultural stereotyping and that postpartum depression will go unrecognized.

Buist et al. (2008b) reported that estimates of postpartum depression vary according to methodology including characteristics of the sample (.e.g.: primiparous, minority groups), definition and measurement of depression (whether using screening tool or diagnostic interview; the cut of score used; whether point or period prevalence is reported; the reported prevalence is major depression or a combination of major and minor depression).

According to Fraser and Cullen (2006) postpartum health problems have an effect on the lives of women and their families, but are largely under-reported by mothers, unless they are specifically asked. Not all women report their feelings and may

spend a miserable 3-12 months trying to hide their unhappiness to avoid the guilt of not enjoying motherhood or the stigma they believe associated with depression.

In summary, the prevalence of postpartum depression varies greatly between countries due to cross cultural variables, biological variability factors, mental health perceptions and its stigma, research methodology (instrument, cut-off points, point or period prevalence etc.). However, in some societies, the reported prevalence is much lower due to somatization of mental illness especially among the non-western cultures. Postpartum depression was more common in certain countries namely Korea, Taiwan and India.

2.2.1 Antenatal depression

Antenatal depression and postpartum depression share the same prevalence rate worldwide (13%) (Ohara and Swain, 1996) but there were less study for antenatal depression. Depression in pregnancy may comprise a woman's well being physically and mentally and most importantly the consequences they carry for the foetus, throughout infancy and later in the development and growth of the child.

Depression during pregnancy is more common than postpartum depression. A large prospective cohort study of 14000 women in Avon, England reported higher depression scores at 32 weeks of pregnancy than 8 weeks postpartum. 11.8% women scored above threshold of 12/13 at 18 weeks of pregnancy, 13.5% at 32 weeks of pregnancy, 9.1% at 8 weeks postpartum and 8.1% at 8 months postpartum. 1.6% women had probable depression at all four time points (Evans et al., 2001). Josefsson et al. (2001) study on 1558 Swedish women reported that depression was higher at 35-36 weeks of pregnancy compared to 6-8 weeks and 6 months postpartum. The prevalence of depressive symptoms was 17%, 13% and 13% respectively during late pregnancy, at 6-8 weeks and 6 months postpartum.

A prospective longitudinal study on the course of anxiety and depression through pregnancy and postpartum period among 8323 British women in England found that the majority cases of postpartum depression were preceded by antenatal depression (Heron et al., 2004). 13% of the women scored above cut-off points on

at least one postpartum assessment and 11% of the women had elevated EPDS Score only in the antenatal period.

High rates of antenatal depression (19%) was reported in a Jordanian sample of 353 women (Mohammad et al., 2010). Among the factors associated with probable antenatal depression in this community include unplanned pregnancy, low social support, difficult marital relationship, poor relationship with mother in-law and worry about finances.

Bilszta et al. (2008) compared the prevalence and risk factors of antenatal and postpartum depression between urban and rural women in Adelaide, Australia. Antenatal depression was more common in the urban group compared to the rural but there was no significant difference in the prevalence of postpartum depression. Antenatal EPDS Score was the best predictor for postpartum depression for urban mothers but for rural mothers, antenatal EPDS score, socio-economic status and psychiatric history had a significant influence on postpartum mood. Antenatal depression was 8.5% and 3.4% in the urban and rural mothers respectively. Postpartum depression was 6.6% and 8.5% for urban and rural mothers respectively but it is not statistically significant.

The negative association of postpartum depression on breastfeeding initiation was well documented but there were only few studies that explored the association between depression during pregnancy and breastfeeding. Few studies have showed conflicting results with some showing decreased breastfeeding intention with increased depression (Fairlie et al., 2009, Insaf et al., 2011, Seimyr et al., 2004) while some showing no association between the two (Pippins et al., 2006, Lee et al., 2005). While Cooper et al. (1993) showed that postpartum depression but not antenatal depression was associated with early cessation of breastfeeding,Insaf et al. (2011) found that women having depression in mid-pregnancy were 21-23% less likely to breastfeed.

2.2.2 Predictors of Postpartum Depression

Risk factors for postpartum depression seem to differ between developed and developing countries. Three meta-analyses found that risk factors for postpartum depression include prenatal depression, self-esteem, childcare stress, prenatal anxiety, life stress, social support, marital status and relationship, history of previous depression, infant temperament, maternity blues, socioeconomic status and unplanned/unwanted pregnancy (Beck, 2001, Ohara and Swain, 1996, Beck, 1996). Leigh and Milgrom (2008) pointed out that the strongest predictor for postpartum depression was antenatal depression which was also a mediator between many risk factors. Besides, postpartum depression was the only significant predictor of parenting stress. Women with higher antenatal depressive scores were 5.6 times more likely to have an elevated postpartum score (Milgrom et al., 2008).

A review of the literature from the meta-analysis of over 14000 subjects on antenatal risk factors for postpartum depression found that strong to moderate risk factors for postpartum depression were depression during pregnancy, anxiety during pregnancy, experiencing stressful life events during pregnancy and the early puerperium, low levels of social support and past history of psychiatric illness (Robertson et al., 2004). Moderate risk factors include neuroticism and difficult marital relationship. Small risk factors are pregnancy related complications and low socioeconomic status. Two meta-analysis of 10000 subjects found the following factors were not associated with postpartum depression: maternal age (risk is higher in teenage mothers), level of education, parity and length of relationship with partner (Beck, 1996, Ohara and Swain, 1996).

Studies conducted within Western societies found no association between postpartum depression and gender of the baby. However, recent studies from India (Patel et al., 2002) and China (Lee et al., 2000) provide evidence which suggested that spousal disappointment with the baby's gender is significantly associated with developing postpartum depression. Immigrant women may be at higher risk of depression because they are culturally and physically separated from their support systems (Nahas and Amasheh, 1999). Women, who perceived that they received low level of social support, even though it is not true, are at higher risk of developing postpartum depression. Also, women in the low socio-economic status and those who were employed outside of the home were more likely to experience postpartum

depression than those in higher income group (Hamdan and Tamim, 2011). Women of low socio economic status are also more prone to depression (Harpham, 1994).

An Australian study of 35374 women, of whom 8.9% were depressed antenatally, identified previous depression, current depression and anxiety, and low partner support as key antenatal risk factors for postpartum depression (Leigh and Milgrom, 2008). Other risk factors include unemployed husband, lower family income, disadvantaged environmental conditions, infant's health problem (Andajani-Sutjahjo et al., 2007, Aydin et al., 2005), newborn gender preference (Patel et al., 2002) and negative confinement experience (Chee et al., 2005). It is important to note that women who have postpartum depression in previous pregnancies are more prone to develop postpartum depression in other pregnancies (Ohara and Swain, 1996).

A prospective cohort study of 559 Singaporean women found unplanned pregnancy, poor emotional support, past history of depression and anticipating potential conflicts with family members as statistically significant antenatal risk factors while postpartum risk factors include, past history of depression, low instrumental support and low marital satisfaction (Chee et al., 2005). In Asia, conflict with mother in-laws is more powerful than marital relationship in the risk of developing postpartum depression (Mohammad et al., 2011).

A Canadian sample (n=627) of well-educated women with support systems was found to have a rate of depression of 4.5% at 6 weeks postpartum (Dunn et al., 2006b). Women in this study were older, well-educated and with support systems in place. In contrast, a high-risk population with relatively poor social support and lack of financial and social resources had 30% women with high level of depression (Fergerson et al., 2002). Dunn et al. (2006a) also found that maternal confidence was the strongest predictor of breastfeeding outcome and that non-modifiable vulnerability factors (age and education) are not as great an influence on early weaning as low confidence or depression.

The prevalence of postpartum depression among 353 Jordanian women was reported to be 22.1% at 6-8 weeks postpartum and 21.2% at 6 months postpartum (Mohammad et al., 2010). According to the literature, high rates of postpartum depression were common in Arab countries. Nature of care provided during labour and birth were contributing factors to probable postpartum depression among these women. Conflict with mother-in-law during postpartum period was a significant

contributory factor for the development of postpartum depression among women in this study (Mohammad et al., 2010).

A study in the United Arab Emirates which identified psychosocial risk and protective factors for postpartum depression additionally identified that number of children, religion and formula feeding as predictive factors while mother's educational level, lack of breastfeeding, personal stressful life events and employment status following delivery as of borderline significance (Hamdan and Tamim, 2011).

Among 377 mothers in a state of Kelantan in Malaysia, the prevalence of postpartum depression at 4-6 weeks postpartum was 20.7%. Antenatal depression and depression at one week postpartum, worried about baby, use of traditional medication and traditional massage were significantly associated with postpartum depression among these women(Kadir et al., 2006). Grace et al. (2001) found the prevalence of 3.9% in postpartum depression among 154 women in her study. The Indians were also more likely to score higher significantly on the EPDS compared to the Malays and Chinese. EPDS did not vary with age, educational achievement or employment status. There was no significant difference in EPDS scores between women with only one child and the others.

Dennis (2005) review of the literature on psychosocial and psychological interventions for postpartum depression interventions found that the only intervention to have a clear preventive effect was intensive postpartum support provided by a health professional and that identifying women at risk assisted in the prevention. Adverse outcomes for the mother in terms of ongoing illness, the health and well-being of the mother and child and the effects on the family require early diagnosis and treatment.

Table 2.7: Summary of risk factors for postpartum depression from Asian studies

Risk Factors	**Studies**
poor social support	(Wang et al., 2003, Chandran et al., 2002, Rodrigues et al., 2003, Glasser et al., 2000, Chaaya et al., 2002, Husain et al., 2006, Chee et al., 2005, Heh et al., 2004, Wang and Chen, 2006, Mohammad et al., 2010)
low self-esteem	(Wang et al., 2003)
low education level	(Wang et al., 2003, Chaaya et al., 2002, Chien et al., 2006, Inandi et al., 2002, Ekuklu et al., 2004)
domestic violence	(Leung et al., 2002, Rodrigues et al., 2003, Patel et al., 2002, Husain et al., 2006)
poor relationship with mother in-law	(Lee et al., 2004, Chandran et al., 2002, Danaci et al., 2002, Green et al., 2006, Mohammad et al., 2010)
antenatal depression	(Lee et al., 2000, Chaaya et al., 2002, Chandran et al., 2002, Glasser et al., 1998, Kitamura et al., 2006, Chen et al., 2004, Aydin et al., 2005, Lee et al., 2004, Lee et al., 2007a, Mohammad et al., 2010, Hamdan and Tamim, 2011)
past history of depression	(Lee et al., 2000, Ho-Yen et al., 2007, Lee et al., 2004)
marital dissatisfaction	(Lee et al., 2004, Glasser et al., 2000)
infant's gender	(Kitamura et al., 2006, Ho-Yen et al., 2007, Chandran et al., 2002, Patel et al., 2002, Rodrigues et al., 2003, Mohammad et al., 2010)
low income	(Chandran et al., 2002, Rodrigues et al., 2003, Patel et al., 2002, Andajani-Sutjahjo et al., 2007, Inandi et al., 2002)
unplanned pregnancy	(Andajani-Sutjahjo et al., 2007, Eilat-Tsanani et al., 2006, Iranfar et al., 2005, Mohammad et al., 2010)
traditional postpartum practices	(Chee et al., 2005, Chien et al., 2006, Leung et al., 2005, Yoshida et al., 2001)

Table 2.7: Summary of risk factors for postpartum depression (cont.)

Risk Factors	**Studies**
multi-parity	(Hamdan and Tamim, 2011)
unemployment	(Chaaya et al., 2002, Aydin et al., 2005, Inandi et al., 2002)
infant's illness	(Aydin et al., 2005, Danaci et al., 2002, Glasser et al., 2000, Andajani-Sutjahjo et al., 2007)
poor relationship with husband	(Gulseren et al., 2006, Dindar and Erdogan, 2007, Chee et al., 2005, Huang and Mathers, 2001, Patel et al., 2002)
not breastfeeding	(Green et al., 2006)
lack of confidants	(Fisher et al., 2004, Rahman and Creed, 2007)
stressful life events	(Ho-Yen et al., 2007, Chaaya et al., 2002)
lack of husband's support	(Aydin et al., 2005, Rodrigues et al., 2003, Sagami et al., 2004)

Table 2.7 above lists the risk factors for postpartum depression from studies conducted among Asian women.

In summary, the risk factors for postpartum depression are similar in the western and non-western countries. However, there are some additional risk factors among the non-western cultures, including poor relationships with mother-in law, infant's gender, domestic violence and traditional postpartum practices.

2.3 POSTPARTUM DEPRESSION AND BREASTFEEDING

The interaction disturbances of depressed mothers and their infants appear to be universal, across different cultures and socioeconomic status. Several care-giving activities also appear to be compromised by postpartum depression including feeding practices, most especially breastfeeding, sleep routines, vaccinations, baby clinics and safety practices (Field, 2010). Many studies reported that postpartum depression has a significant influence on infant feeding practices (Henderson et al., 2003, Dennis and McQueen, 2007, Galler et al., 2006, Hatton et al., 2005).

Studies that have examined the association between postpartum depression and breastfeeding had been contradictory. There were reduced odds of continuing breastfeeding among postpartum depressed mothers (Dennis and McQueen, 2007) but there was also studies where depression was not related to breastfeeding (McCarter-Spaulding and Horowitz, 2007a). Table 2.8 list the findings of the studies which had examined the association between breastfeeding and postpartum depression.

Lower preference for breastfeeding at 7 weeks (Galler et al., 1999) and breastfeeding discontinuation at 12 weeks (Taveras et al., 2003) have been reported among mothers with higher depressive scores in Barbados and California respectively. Chung et al. (2004) reported that 48% and 12% of 774 largely single African American women in his study had point prevalence and period prevalence of depression respectively and that there was an overall trend of decline in breastfeeding rate with increasing depressive symptoms. Fergerson et al. (2002) claimed that the only factor found to be associated with higher depressive score was early cessation of breastfeeding. According to Dunn et al. (2006b), low confidence in breastfeeding and higher depressive scores had greater influence on early weaning than age and education of the mother. Greater scores for depression at 3 months postpartum correlated to shorter breastfeeding duration (Papinczak and Turner, 2000).

Labbok (2001), from her personal experience observed that in countries where exclusive breastfeeding is the norm, the incidence of postpartum depression peaks at 9 months postpartum whereas in countries where formula feeding is the norm, postpartum depression peaks at 3 months postpartum.

In the United States, a study on 122 mothers showed that severity of symptoms of depression (EPDS≥10, BDI) was not a significant predictor of feeding pattern at 4-8 weeks, 10-14 weeks or 14-18 weeks postpartum (McCarter-Spaulding and Horowitz, 2007b). In this study, it was found that mother's education influence on breastfeeding appears to be stronger than the influence of postpartum depressive symptoms. The author suggested that if maternal characteristics were associated with high motivation to breastfeed, then such traits might have been more powerful influences than the presence of postpartum depressive symptoms.

Bogen et al. (2010) showed that maternal depressive symptoms during pregnancy or early postpartum were neither associated with infant feeding intention nor with breastfeeding initiation or breastfeeding status at 2 or 12 weeks postpartum. However, although Fairlie et al. (2009) also found that prenatal depressive symptoms was not associated with failure to initiate breastfeeding, women who have depressive symptoms were two times more likely to have prenatal plans to formula feed compared to women without depressive symptoms. In this study, despite their initial intention to formula feed, women with postpartum depressive symptoms more often initiated breastfeeding. In comparison, Lee et al. (2005) in a study which involved 856 mothers in Ontario, Canada, found no significant association between depressive symptoms and breastfeeding intention among the low-income women in her study. However, depression was negatively associated with full breastfeeding at 1 week. In this study, only 68% of infants were fully breastfed at 1 week and 23% at 6 months.

According to Hatton et al. (2005), the inverse relationship between depressive symptoms and breastfeeding is stronger earlier in the postpartum period than later. Given that the most common reason given for early termination of breastfeeding is the perception of insufficient milk production, there is a possibility that postpartum depression may interfere with milk production or let down. Hatton et al. (2005) reported that women with more depressive symptoms in his study were less likely to breastfeed when assessed at 6 weeks but revealed no difference with 'not breastfeeding' at 12 weeks which suggested that depression in the earlier weeks of postpartum may lower the prevalence of breastfeeding. However, conversely, Fleming et al. (1988) reported that depressed mood at 3 months postpartum was associated with a significant reduction in breastfeeding but there were no differences when mood was measured at 3 days or at 1 month.

Alder and Cox (1983) reported that women who totally breastfeed their babies for at least 12 weeks had a higher incidence of postpartum depression (Standardized Psychiatric Interview) than those who were partially breastfeeding. They commented that depression could be related to difficulties in successfully breastfeeding. Depressed mothers were also less likely to believe that breastfeeding was better for their infants, reported no confidence that breastfeeding leads to mother infant bonding and more likely to report that breastfeeding was restrictive (Galler et al., 2006).

Most women experience problems with breastfeeding if they expect breastfeeding to be something natural but it is actually learned (Binns and Scott, 2002). Women who strongly value breastfeeding are more likely to be depressed if they are unable to breastfeed. The promotion of breastfeeding with the strong message of 'breast is best' could equate with breastfeeding with being a good mother and that breastfeeding is linked to maternal identity (Schmied et al., 2001). It would affect the mother if they regarded themselves as 'not a good mother' for not being able to give the best to their baby (McCarter-Spaulding and Horowitz, 2007a, Mozingo et al., 2000).

Failure to practice what is 'best' is perceived as questionable and a sign of a woman's failure as a mother (Atchan et al., 2011). Sheehan et al. (2003) reported that women in her study felt that information promoting 'breast is best' contributed to the pressure to breastfeed. They felt health professionals saw breast is best for the baby and that they needed to feed at all cost and if they did not, their babies would be disadvantaged and they would be considered as bereft as a mother. This can create unhappiness and depression when mothers perceived breastfeeding as something very important and have strong intentions to breastfeed.

In one study, women who did not feed their infants as planned reported significantly higher scores for depression and guilt than those who achieved their plan (Chezem et al., 1997). A phenomenological study investigating lived experiences of women who stopped breastfeeding within 2 weeks explained that majority of the women talked about failure, guilt, disappointment, shame and self-doubt about not continuing breastfeeding (Mozingo et al., 2000).

Women who do not associate maternal identity with breastfeeding are more likely to stop breastfeeding earlier (Cooke et al., 2007). Intention to breastfeed is a strong predictor of actual breastfeeding (Groer, 2005b, McKee et al., 2004a, Dunn et al., 2006b). Breastfeeding problems and lack of confidence in the ability to breastfeed are associated with early discontinuation of breastfeeding (Taveras et al., 2003).

Women who are least likely to breastfeed are those who have negative attitudes towards breastfeeding and have low confidence in their ability to breastfeed (Dennis, 2002). In contrast, women who believe that breastfeeding was better for their infants were more likely to breastfeed (Galler et al., 2006). Longer breastfeeding duration

was significantly associated with increased breastfeeding self-confidence (Papinczak and Turner, 2000).

With regard to the benefits of breastfeeding to the mother, breastfeeding is associated with better physical and mental health (Mezzacappa, 2004) and fewer symptoms of stress (Mezzacappa et al., 2000). Breast-feeders had lower depression and breastfeeding appears to be protective of negative moods and stress (Groer et al., 2002). According to Groer et al. (2002), bottle-feeding mothers might be physiologically fragile and more susceptible to postpartum illness.

Bick et al. (1998) reported reasons for breastfeeding discontinuation include high depression scores. One of the top five breastfeeding problems in the first week postpartum was mother feeling 'blue' (Kearney et al., 1990). It was suggested that early-onset depression may lead to breastfeeding cessation due to feelings of inadequacy (Henderson et al., 2003, Alder and Cox, 1983) and less responsive to infants cues and thus fails to meet the needs of the infants (Beck, 1995a).

Links between maternal stress and impaired lactogenesis have been seen in human and animal models. The presence of stressful life events could have a negative effect on lactation, making it more difficult to initiate breastfeeding. Some aspect of breastfeeding may have been distressful and cessation of breastfeeding may have relieved the distress (Hatton et al., 2005). However, hormonal alterations due to termination of lactation may worsen depressive symptoms (Seidman, 1998).

Groer (2005b) reported that depression appeared to be influenced by income, with the highest level of depression appearing in the poorest mothers and these are typically mothers who do not breastfeed. Everyday stressors were more strongly associated with depressive symptoms than were major life events (Groer et al., 2002). Warner et al. (1996) found that not breastfeeding was associated with depression at 6 to 8 weeks postpartum in his study involving 2375 British women.

According to Groer et al. (2002) although mothers may be subjected to many stressors in the postpartum period, nature has apparently designed a way to decrease the magnitude of their physiologic response to stress if they breastfeed. It was also reported that breast-feeders had lower perceived stress, lower depression and anger than formula feeders (Groer, 2005b). Women who breastfeed had

significantly lower depressive symptoms and higher plasma prolactin levels than women who did not breastfeed and it is important to sustain high prolactin level for normal maternal behaviour (Abou-Saleh et al., 1998). A study among 70 women from the United Arab Emirates revealed that mothers who breastfed had significantly lower scores on the Edinburgh Postpartum Depression scale at 8 weeks postpartum than those who did not (Abou-Saleh et al., 1998).

Breastfeeding was found to be a protective factor while formula feeding is a risk factor for postpartum depression (Hamdan and Tamim, 2011). Women using formula were more likely to be diagnosed with postpartum depression. 'Any breastfeeding' was not significantly correlated with depression (had borderline significance). Women who had breastfed at all and were breastfeeding at time of the data collection had lower scores on the EPDS than women who had not breastfeed or breastfeed for a shorter period of time. Frequency of breastfeeding was also correlated with EPDS scores with greater frequency related to lower scores.

Dennis and McQueen (2007) investigated the effect of maternal moods on infant feeding outcome and vice versa and found that depressive symptoms does not significantly influence infant feeding method at the time of onset but rather may take several weeks for breastfeeding discontinuation. Similarly, infant feeding method in the immediate postpartum period does not predict the development of postpartum depression. She also found that mothers with depressive symptoms at 1 week were more likely to report at 4 and 8 weeks that breastfeeding was progressing terribly, dissatisfaction with infant feeding method and low levels of breastfeeding self-efficacy.

Four types of emotional states associated with the mother's choice of feeding method are identified as 'content', 'guilty or deprived', 'socially constrained' and 'forced'. The 'content' group consists of mothers who formula feed and believe formula feeding is equal to or even better for the baby. The 'guilty or deprived' mothers are those who chose to formula feed but believe in the health benefits of breastfeeding. The 'socially constrained' mothers are those who chose to breastfeed and believe breastfeeding is best for the baby. The 'forced' are those who breastfeed but believe formula feeding is equal to or even better for the baby and mother.

A study which assessed maternal feelings after cessation of breastfeeding showed that average scores of sadness/depression, guilt, madness/anger and relief were not significantly different between women with their breastfeeding goals and women who did not (Chezem et al., 1997). However, women who did not feed their infants as planned once employed reported significantly higher scores for depression and guilt than women who achieved their prenatal plan for infant feeding during employment. Following breastfeeding cessation, most subjects felt some degree of sadness/depression, relief and guilt. Of the three emotions, guilt was reported most frequently and intensely.

Nishioka et al. (2011) who conducted a study on breastfeeding and the relationship with postpartum depressive symptoms at 1 and 5 months postpartum among 405 mothers found no significant difference between the breastfeeding and formula feeding group. Multivariate regression analysis identified EPDS Score of >9 at 5 month postpartum as a significant factor underlying the switch from breastfeeding to formula milk feeding. The percentage of mothers with an EPDS Score of >9 at 1 month and 5 months postpartum was 19.5% and 13.0% respectively.

Green et al. (2006) study found that the risk factors for postpartum depression that emerged from his study was not breastfeeding, giving birth to the first child, poor body image, poor relationship with mother in-law and older age at marriage. Among 93 women in Barbados, mild depression was 16% at 7 weeks, but increased to 19% at 6 months. Disadvantaged environmental conditions including less information seeking by the mother, lower family income and poor maternal health were closely associated with increased symptoms of depression in all women. Depressive symptoms at 7 weeks postpartum predicted a reduced preference for breastfeeding at current and later infant ages. Conversely, feeding practices did not predict maternal moods at later ages (Galler et al., 1999).

Breastfeeding that is going well protects maternal mood by lowering stress but pain related to breastfeeding becomes a trigger to depression rather than something that lessens the risk (Kendall-Tackett, 2007). Women's negative breastfeeding experience could be a predictor of postpartum depression.Watkins et al. (2011) studied the association of early breastfeeding experiences and postpartum depression on 2586 women from a secondary data in the United States. They found that severe breastfeeding pain was associated with a twofold increase in odds of

postpartum depression and women who disliked breastfeeding were 1.42 times as likely to have postpartum depression 2 months after delivery compared with women who reported 'liking breastfeeding'. They also reported that women who were depressed were also less likely to continue breastfeeding at 2 months compared with those women without depressive symptoms.

Women who dislike breastfeeding or with severe breastfeeding pain were more likely to experience postpartum depressive symptoms (Watkins et al., 2011). At 2 months, mothers with depressive symptoms were less likely to still be breastfeeding compared to mothers without depressive symptoms. Zauderer and Galea (2010) commented that although postpartum depression has an effect on breastfeeding, it is unnecessary for complete discontinuation.

Breastfeeding is often a painful and difficult experience for women and that depression in pregnancy influences that experience. In a study in England (n=152) women who were relatively depressed (BDI≥13) during pregnancy went on to report greater physical difficulties in breastfeeding and were faster to give up breastfeeding(Hellin and Waller, 1992b).

Henderson et al. (2003) studied the impact of postpartum depression on breastfeeding duration among 1745 Australian women at their 2, 6 and 12 months postpartum. Breastfeeding was initiated by 96% of the participants. At 2 months postpartum, 79% were still breastfeeding, 57% at 6 months and 22% at 12 months. Of the 18% diagnosed with postpartum depression, the onset occurred before 2 months in 63% of cases. Early cessation of breastfeeding was significantly associated with postpartum depression. The onset of depression occurred at or before cessation of breastfeeding in 93% of cases(Henderson et al., 2003).Women who experienced postpartum depression at any time had a 1.25 times greater risk of having stopped breastfeeding than women who were not depressed at that time. Of the women who developed postpartum depression in the 6 months after birth, 82% stopped breastfeeding at a time after onset and 11% stopped at the time they became depressed and only 7% stopped before they developed symptoms of postpartum depression.

Additionally, in a retrospective study of 51 postpartum women, Misri and Sinclair (1997) identified that depression began before the cessation of breastfeeding in

83% self-reported women where 73.1% women reported having depressive symptoms within the first 2 months postpartum. These studies showed that infants of mothers with depression are less likely to receive the health and nutritional advantages of prolonged breastfeeding. This outcome may hold special significance for these infants, who are at risk of emotional disturbances and cognitive and developmental delay because of their mother's depression.

The pharmacological treatment of postpartum depression is complex if women are breastfeeding and it is known that some anti-depressant drugs cross over into the breastmilk (Almond, 2009). Cognitive behavioural therapy has been shown to be as effective as antidepressants in treating severe postpartum depression (Appleby et al., 1997). It is recommended that all women should have their mental and emotional health assessed postnatally so that presence of postpartum depression can be ascertained. Many countries in the world have multicultural populations, therefore services need to be inclusive and culturally sensitive (Almond, 2009).

Breastfeeding appear to be protective against anxiety. In one study, mothers in the full, exclusive breastfeeding group had significantly lower State Trait Anxiety Inventory scores than those who were partially breastfeeding or who had terminated breastfeeding (Britton, 2007). Anxiety, like depression appears to be an important predictor of early breastfeeding discontinuation yet the nature of the relationship between anxiety and lactation remains unclear (Britton, 2007).

Table 2.8: Studies on the association of breastfeeding and postpartum depression

Findings	Sample	Measuring tool
Women with depressive symptomatology were more likely to discontinue breastfeeding than those with no symptomatology	526 Canadian (Dunn et al., 2006a)	EPDS≥12 At 6 week
Discontinuation of breastfeeding at 12 weeks was associated with the presence of depressive symptoms	1163 American (Taveras et al., 2003);	CES-D>15 at 2 weeks
Increased breastfeeding duration was significantly associated with decreased levels of depressive symptoms	159 Australian (Papinczak and Turner, 2000);	Duke Health Profile at 12 and 24 weeks
Women with higher EPDS Score (≥12) were more likely to have stopped breastfeeding early	906 British (Bick et al., 1998)	EPDS≥12 at a mean of 45 weeks
Depressive episodes preceded the cessation of breastfeeding	483 British (Cooper et al., 1993);	PSE and SPI at 8 weeks
Early discontinuation of breastfeeding was found to be significantly associated with postpartum depression	Australia (1745) (Henderson et al., 2003);	EPDS>12 at 8, 24, 52 weeks
Majority of the mothers reported that their depression preceded the cessation of breastfeeding	51 Canadian (Misri et al., 1997)	DSM-IV for major depression
Significant predictive relationships between maternal mood and infant-feeding practices were found	93 and 226 Barbados (Galler et al., 1999, Galler et al., 2006)	ZDS at 7 and 24 weeks
A failed attempt at breastfeeding or early cessation of breastfeeding was significantly associated with higher scores on the EPDS (≥10)	37 American (Fergerson et al., 2002);	EPDS>9 at first postpartum visit
Mothers with depressive symptomatology were less likely to continue to breastfeed to 8-16 weeks	5564 Americans (secondary data) (McLearn et al., 2006)	CES-D>10 at 8-16 weeks
No relationship was found between infant-feeding outcomes at 1 week postpartum and development of depressive symptomatology but mothers were more likely at 4 and 8 weeks to discontinue breastfeeding	594 Canadian (Dennis and McQueen, 2007)	EPDS at 1, 4 and 8 weeks

Table 2.8: Studies on the association of breastfeeding and postpartum depression (cont.)

Findings	Sample	Measuring tool
Breastfeeding did not influence maternal mood	105 UK women (Cox et al., 1982)	SPI during pregnancy and 10days, 12-20 weeks postpartum
No association was found between breastfeeding and depressive symptomatology	132 Swedish women (Josefsson et al., 2002)	EPDS>9 at 6-8 and 24 week postpartum
No significant difference in mood scores between mothers who were breastfeeding and those who were bottle-feeding	81 UK women (Kendell et al., 1981)	Visual analogue scales daily to 3 weeks
No relationship was found between breastfeeding practices (partial and exclusive) and depressive symptomatology. Depressive symptomatology did not predict breastfeeding continuation	174 USA women (McKee et al., 2004a)	BDI at 12 weeks
Early depressive symptomatology was not associated with infant-feeding method	1200 Hong Kong women (Lau and Chan, 2007)	EPDS>9 at 2-5 days postpartum
Depressive symptomatology was not predictive of infant-feeding practices	409 Canadian (Ramsay et al., 2002)	EPDS>12 at 8,24, 40 and 54 week
Infant feeding method did not predict depressive symptomatology	142 Irish (O'Neill et al., 1990)	EPDS>12 at 6 week

BDI=Beck Depression Inventory; CES-D=Centre for Epidemiologic Studies Depression Scale; PSE=Present State Examination; SPI=Standardized Psychiatric Interview; DSM-IV=Diagnostic and Statistical Manual of Mental Disorders (fourth edition); ZDS=Zung Depression Scale.

Table 2.8 above showed the results of other studies on the relationship between postpartum depression and infant feeding outcomes.

From these studies, it can be summarised that:

1) Some studies reported that postpartum depression leads to breastfeeding cessation while others reported that breastfeeding cessation leads to the development of postpartum depression.

2) Exclusivity of breastfeeding protects mothers from depressive symptoms especially in the early postpartum period.
3) Mothers' strong motivation to breastfeed, confidence in breastfeeding and positive attitudes towards breastfeeding are stronger influence on breastfeeding than the influence of postpartum depression.
4) Guilt and failure of unsuccessful breastfeeding contributes to depression in mothers who have strong determination to breastfeed.

Comparisons between studies reported various associations due to the different diagnostic tools, cut-off points and postpartum periods in these studies.

2.4 Postpartum depression and cultural factors

Postpartum depression is less prevalent in some traditional cultural settings (Halbreich and Karkun, 2006a). Some studies report that postpartum depression is 'culture bound' and women from developed countries are more exposed to postpartum depression due to lack of social support (Stern and Kruckman, 1983). However, increasing evidence suggests that postpartum depression is becoming more than a problem of developed countries. In Turkey, postpartum depression is reported to range from 14% to 40.4% (Aydin et al., 2005, Ayvaz et al., 2006, Danaci et al., 2002, Ekuklu et al., 2004) while in Vietnam (Fisher et al., 2004) and India (Patel et al., 2002) reported prevalence were 33% and 23% respectively.

Cultural traditions can reduce or increase the prevalence of postpartum depression. From the review of the literature on the implications of traditional postpartum practices and rituals on postpartum depression, Grigoriadis et al. (2009) reported that the key protective element may be the presence of welcome support rather than the specific ritual. Social support may be the most important aspect of any type of postpartum ritual.

Hopkins and Campbell (2008) analysed four types of support namely partner support, parent support, in-law support and extended family and friends support among 126 Caucasian women. It was noted that postpartum depression is related specifically to a lack of support from the partner rather than to a lack of social support in general. The role of the husband in a woman's confinement process is

important either as provider of instrumental or emotional support, a buffer against mother in-law tension or a contributor to poor mental health through critical remarks or lack of support.

Cultures with strong social support for new mothers (help with childcare, special foods, rituals bath, return to her home of origins) apparently have a lower prevalence of postpartum depression (Leigh and Milgrom, 2008). According to Halbreich (2005a), in cultures where new mothers are provided with high level of family support and pampering, low levels of postpartum depression are reported or may be delayed until the pampering ends and the mother faces the reality of day to day life.

The weaker family ties between parents and married children among the Taiwanese in Taiwan led to similar depression rates to the British in the United Kingdom (Huang and Mathers, 2001). In a study among 186 Taiwanese which reported a 42% prevalence of postpartum depression, women living with their own mothers reported lower depression than those living with their mother in-law. Xie et al. (2009) conducted a prospective cohort study assessing the association of antenatal and postpartum social support with postpartum depression among 534 pregnant women in Hunan, China. The prevalence of postpartum depression was 19.29% and that women with low prenatal and postpartum social support had higher rates of postpartum depression. The association between postpartum social support and postpartum depression is much stronger than that of prenatal social support.

However, it is inaccurate to presume that confinement is available to all women or always experienced as supportive. Cultural factors can be alleviating when the woman has negative perceptions on cultural traditions and social support received. In Singapore, 37.8% Chinese women perceived their confinement experience as neutral or a negative one due to conflicts with family members and not enjoying the traditional cultural practices such as the postpartum massages, special dietary practices and seclusion (Chee et al., 2005).

It was argued that support may be protective of postpartum depression depending on the type of support received and from whom it was received (Heh et al., 2004). Kadir et al. (2006) reported a 20% prevalence of postpartum depression despite of the fact that 95% of the women received support during the confinement period.

Likewise, *Satogeri Bunben* did not make any difference in terms of postpartum depression among Japanese mothers who received support (Yoshida et al., 2001).

However, social support may not always be beneficial. Apparent decrease in postpartum depression may be a result of social pressure not to report symptoms or pressure to accept without complaint. Being a new mother means the end of easy free days and the beginning of responsibility and hard work. If depressive symptoms developed, it was regarded as a necessary part of maternal role rather than an abnormal condition such as postpartum depression. In Confucian societies, repressing one's emotions may be considered essential in maintaining social harmony. The relationship between social support and postpartum depression is clearly not simple. Grigoriadis et al. (2009) argued that further studies are needed to test the hypothesis that social support is the direct protective factor underlying dietary and other ritual practices.

A study on how social support and social conflict relate to prenatal depressive symptoms in a prospective study involved 1047 pregnant women from early pregnancy through one year postpartum (Sheiner et al., 2005). 33% mothers had elevated levels of depressive symptoms and those with less education and not in a relationship with the infant's father were more likely to have depressive symptoms. Social conflict emerged as a stronger predictor of depressive symptoms than social support. In this study, it was found that having a good relationship with a partner and having adequate social support protects against postpartum depression. Working mothers and married mothers have lower levels of depression and higher levels of social support than do unemployed and unmarried mothers. Perceived financial stress or perceptions of financial adequacy, rather than income level, may be a better measure of the impact of socioeconomic factors on maternal mental health outcome.

A review of the role of traditional confinement practices in determining postpartum depression in Chinese cultures found that 8 studies reported that it had protective role, four studies had increased risk and that four studies had inconclusive findings (Wong and Fisher, 2009). According to Pillsbury (1978) the ritual of confinement in Chinese cultures provided guidance and social support while the mother adapted to her new role and thus prevented postpartum depression. Traditionally, mothers-in-law exercised significant power in Chinese households had had a major influence on

the postpartum care of new mothers. Women experiencing postpartum depression reported conflict in attempting to conform to the Chinese tradition of being compliant and submissive wives, which is necessary to maintain family harmony. Contemporary Chinese women have to negotiate familial relationship within different value systems often worsened by a lack of support from their husbands.

While Pillsbury (1978) regard the 'doing the month' which is the traditional confinement practices among the Chinese as the protective factor to postpartum depression, Heh et al. (2004) reported that the rituals are actually increasing the risk of postpartum depression among women in his study. Contrastingly, another study reported that adherence to 'doing the month' practices is associated with fewer physical and depressive symptoms among postpartum women in Taiwan (Chien et al., 2006).

Among the Malays, it is a custom to adhere special confinement practices after childbirth up to 40 to 44 days postnatally. Among the practices are traditional massages, *bertungku* (putting heated stones on the tummy) *bersalai* (lying on a special bed with fire), wearing traditional corsets, consuming and applying traditional medicine and food taboos. In one Malaysian study, 87.0%-97.0% of the women still practiced these confinement routines (Kadir et al., 2006). In this study, neither types of *pantang* had a statistically significant effect on EPDS. EPDS showed a trend to be higher in women living with their family although this was not statistically significant. Women who had practices more components of *pantang* showed a significantly higher mean of EPDS compared with those who practised less. Although not statistically significant, more depressed women and those with higher somatisation scores are more likely to adhere to more traditional postpartum behaviour and rituals.

According to Chen (1973) customs related to childbirth in rural Malay culture could be divided into four categories which were the beneficial, the harmless, the harmful and those of uncertain effect. The beneficial practices were prolonged breastfeeding, restricted activities of the mother and massage. The harmful included the dietary taboos which need to be adapted by friendly persuasion and health education.

With regards to the effects of postpartum practices on breastfeeding, a few noticeable factors are the dietary factor and the support provided by female family members. The postpartum diet which contained naphthalene and herbs has caused high incidence of neonatal jaundice in Southeast Asia. Consequently, mothers abandoned breastfeeding to overcome the jaundice problem rather than changing their diet (Chan, 1980). Regular childcare support from other female relative has been found to be a predictor for early breastfeeding cessation (Bick et al., 1998).

Certain traditional practices associate positively in the development of postpartum depression while others are vice-versa. Kadir et al. (2006) reported that the use of traditional medicine was found to be the strongest predictor of postpartum depression. Risk of postpartum depression increased 10-fold in women who used traditional medicine after delivery. They argued that the chemicals in these medicines could have some effect in the development of postpartum depression. In terms of massage, part of the protective effect of massage may be the social support itself as the traditional masseuse is often a close friend to women in the community. In another Malaysian study which was conducted among 154 mothers, women who practiced specific postpartum practices had a lower EPDS than those who did not (Grace et al., 2001). Additionally, Chien et al. (2006) found that adherence to 'doing the month' was associated with lower depression scores. Women with lower adherence scores to rituals had higher odds ratios of depression. It may be that women who are depressed are more likely to practice rituals, take traditional medicine or follow special diet in an attempt to treat their symptoms (Bashiri et al., 2011).

The beliefs and practices had been handed down to the women by their mothers, mothers-in-law or grandmothers. It seems that overemphasis of these practices could be harmful for the mother as well as her infant. It should be noted however that prohibition of hygiene practices that appear to be unhealthy may not only have a positive effect; sometimes such a measure may also have the effect of reducing the quality of the women's lives. Some women avoided fresh fruits and vegetables. From a health perspective, this deprives them of vitamins and may contribute to constipations and haemorrhoids. If they eat enough warmer fruits and vegetables, these problems can be avoided (Lundberg, 2010).

Conflict between traditional and modern life could become a stressor when mothers expressed frustrations when certain rituals were found infeasible (Leung et al., 2005). Women forced to carry out postpartum rituals may find them stressful rather than helpful (Bashiri et al., 2011). Confinement is not necessarily protective against depression, it may even be a risk factor if it is not perceived as helpful (Chee et al., 2005). Clearly, future research addressing the effect of rituals need to take into account the cultural context, the degree of participation, the kind of support received and from whom it is given.

In summary, social support especially from the husband/partner is the most important cultural aspects that affect postpartum depression. However, regardless of the type of cultural traditions, negative perceptions can alleviate postpartum depression. Some aspects of cultural practices are useful to the mothers in protecting mothers from depressive symptoms but some are not.

CHAPTER THREE: METHODOLOGY

Overview

This chapter describes the methodology used in this study specifically study locations, study design and collection procedure, sample size calculations and research instruments. The conceptual framework of the study, statistical analysis and information on ethical issues are also being described.

RESEARCH METHOD

3.1 Study location

This study was conducted in the districts of Kota Kinabalu and Penampang in Sabah. Five Maternal and Child Health Clinics (MCH) in Kota Kinabalu, Putatan, Penampang, Luyang and Inanam were involved in this study. These are the five largest MCH clinics that mothers living in these areas attend for their antenatal and postpartum check-ups. Mothers usually go to the one in the area they live in. A sample of mothers and infants attending these MCH clinics is a good representation of the population of Kota Kinabalu and the surrounding areas. Pregnant mothers come to the clinics for the antenatal check-ups which are conducted monthly until 28 weeks of gestation, fortnightly until 35 weeks of gestation and weekly from 36 weeks gestation until delivery. Mothers attending these clinics usually deliver their babies at Likas Specialist Hospital. It is the main public maternity hospital in Kota Kinabalu and the referral centre for Obstetrics & Gynaecology and Paediatrics cases for Sabah. Approximately, 35-50 babies are delivered in this hospital each day. After delivery, mothers attend the same Maternal and Child Health Clinics for the routine immunisation and health checks of the newborn at monthly interval up until 6 months and at 8, 10 and 12 months postpartum.

3.2 Study design and data collection procedure

This is a prospective cohort study which involved women attending the Maternal and Child Health Clinics in the district of Kota Kinabalu, Sabah, Malaysia. Recruitment was at their 36-38 weeks antenatal check-ups. All pregnant women with single pregnancy only were being approached and invited to participate in the study. Recruitment was done consecutively until the quota for each clinic (400) had been reached.

An information sheet was given to all potential recruits and informed consent was requested and obtained prior to recruitment (see APPENDIX B). The recruitment was conducted by the trained enumerators who selected all the mothers on random basis from the register at the clinics. Mothers who agreed to participate were taken to a special room for privacy. They were interviewed by the enumerators.

After delivery, exclusion criteria include:

1. maternal or infant illnesses that excluded breastfeeding.
2. severe medical problems that require transfer to another hospital.

The number of mothers in these categories was very small. All eligible respondents were then followed up at 1 month, 3 months and at 6 months postpartum when they returned to the clinics for the immunization and health checks of the newborn.

3.2.1 Sample Size Calculation

Sample size was calculated using the EpiInfo, StatCalc programme based on the following:

Confidence Interval	0.95
Power	0.80
Ratio (unexposed: exposed, i.e. non PND, PND)	1:5
Estimate breastfeeding rate at 3 months in non PND mothers	60%
Estimate breastfeeding rate at 3 months in PND mothers	48%
Sample size calculated (172 with PND, 859 without PND)	**1031**

A sample of 2000 mothers was recruited to allow for losses to follow up in the study population. The aim was to recruit all pregnant women with a single pregnancy until 2000 women have been recruited to allow for dropouts and missing data. It was estimated that the dropout would be 50% at the end of the six months period.

3.3 Research Instruments

Mothers were asked to complete the following questionnaires.

Table 3.1: Questionnaires Administration

Questionnaire	36 weeks	1 month	3 month	6 months
Demographic & breastfeeding information	X		X	
Iowa Infant Feeding Attitude Scale (IIFAS)	X			X
Edinburgh Postpartum Depression Scale (EPDS)	X	X	X	X

3.3.1 Demographic and breastfeeding Information.

The questionnaire include full details of infant feeding methods and factors likely to influence the initiation and duration of breastfeeding and was based on the questionnaires that have been developed for and extensively used in breastfeeding cohort studies in China, Australia, Vietnam and Kenya (Scott et al., 2001, Scott et al., 1999, Duong et al., 2004, Lakati et al., 2002, Xu et al., 2007). The questionnaires were translated into Malay and were then tested in focus groups to ensure cultural appropriateness. Obstetric information included parity, number of children, miscarriage, abortion, stillbirth, mode of previous delivery, previous birth experience and if present pregnancy was planned. Questions on cultural beliefs and traditional practices were included in the questionnaire.

3.3.2 Iowa Infant Feeding Attitude Scale (IIFAS)

The IIFAS is a 17 item scale which provide a reliable and valid assessment of maternal attitudes toward infant feeding (De la Mora and Russell, 1999). It is easy to administer and usable in a wide variety of population. Questions included concern in the costs of infant feeding, nutrition, convenience, sexuality and infant bonding. Women were asked to indicate the extent to which they agree with each statement

on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Total scores could range from 17 (reflecting positive formula feeding attitudes) to a high of 85 (indicating attitudes that favour breastfeeding). The IIFAS was included in the questionnaires at antenatal, 3 months and 6 months.

3.3.3 Edinburgh Postpartum Depression Scale (EPDS) – Malay version

The Edinburgh Postpartum Depression Scale (EPDS) is a 10-item self-report rating scale that was designed specifically to screen for postpartum depression. It is straightforward and easy to administer. This scale has been translated to more than 10 languages and had been used in various countries with different cultures and languages. The scale is a screening tool which rates the intensity of depressive symptoms and does not provide clinical diagnosis of depression. Each item was scored on a 4-point scale (from 0-3), with the total scores ranging from 0-30 (Cox et al., 1987a). In Malaysia, this scale had been translated and validated by Azidah et al. (2004). The author suggested 11.5 as the optimum cut-off point for 72.7% sensitivity, 95.0% specificity and positive predictive value of 80%. Therefore, women with the EPDS scores of ≥12 were categorized as having depressive symptoms in this study.

All of the questionnaires were translated and back translated independently to ensure accuracy.

- Pre-testing of all questionnaires was conducted in focus groups to ensure that the questions were understandable and to identify any errors relating to cultural differences.
- Five enumerators were trained by the researcher to administer the questionnaires. There were 5 sessions each which they were observed by the researcher prior to the pilot study.
- A protocol was developed to avoid measurement bias and ensure data comparability between the enumerators. The protocol consisted the exact words that the enumerators read out while obtaining consent process and giving instructions for participants in completing the questionnaires.

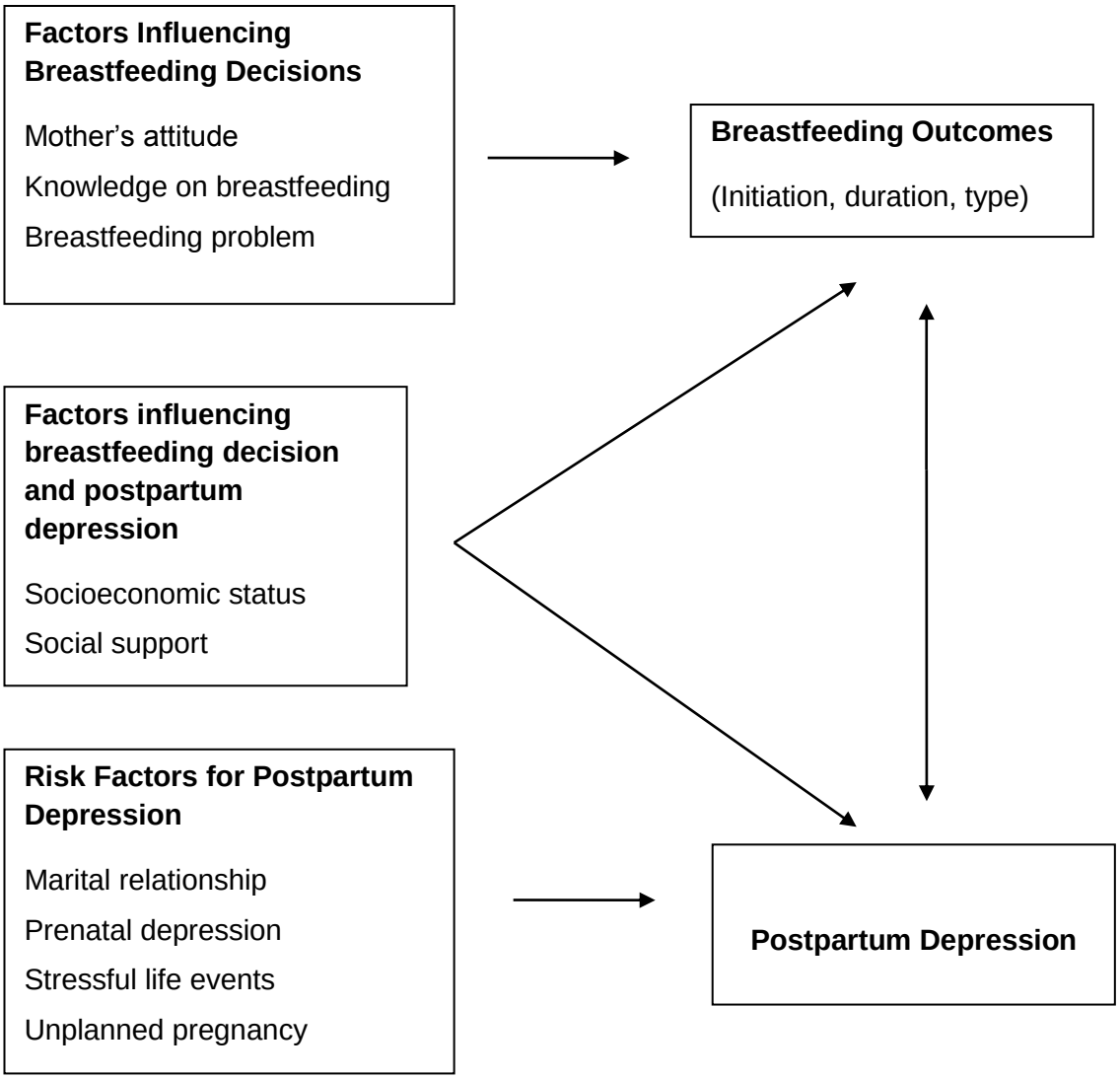

Figure 3.1: Conceptual Framework of the study

3.4 Statistical Analysis

3.4.1 Descriptive and Univariate Analysis

The data was first screened for outliers and errors and subsequently cleaned. Mean and standard deviations or frequency distributions were used to describe the sample at baseline in terms of their demographic characteristics. Descriptive statistics were also generated for all variables in the questionnaires. Univariate analysis (chi-square and t-tests) were used to describe the sample characteristics and to identify patterns in the data, as well as making comparisons between subgroups of interest. For each continuous outcome variable, paired t-test was used to compare mean values and if there was a significant change. For each categorical variable, chi-square test was conducted to determine the association between the two variables. After identifying potential significant factors, multivariate logistic regression analysis was undertaken to identify important variables affecting the breastfeeding duration and postpartum depression outcomes. Confounding variables considered in the multivariate analyses were obtained from the literature, including demographic factors, psychological factors, social, cultural and traditional beliefs. All data were coded analysed using Predictive Analytics Software (PASW) 9 (formerly SPSS Statistics) for windows, version 18.0 (Levesque, 2007). Two-sided p-values less than 0.05 were considered significant.

3.4.2 Generalised Logistic Estimating Equations (GEE)

For the 3 major study outcomes, namely, the effect of breastfeeding duration and postpartum depression, the effect of postpartum depression on breastfeeding duration and the effect of antenatal depression on breastfeeding duration, separate logistic GEE models were constructed. The GEE models analysed whether there was a significant change in these outcomes while controlling for potential confounding factors. The GEE method, developed by Zeger and Liang (1986) is suitable for longitudinal or repeated measures study designs where observations within each participant are not independent. GEEs permit specification of a certain working correlation matrix that accounts for this within-subject correlation, thus providing more robust regression coefficients (Ballinger, 2004). Logistic GEE were constructed because each major outcome was analysed as a categorical variable and an exchangeable working correlation structure was adopted.

The major study outcome (breastfeeding duration or postpartum depression) were entered as outcome variables in each logistic GEE model and time (1month, 3 months, 6 months) was added to the model as an explanatory variable. All potential confounding factors were then entered into the GEE model and the outcomes were modelled while controlling for these. In each of the three models, explanatory variables with two-sided p-values less than 0.05 were considered significant. All the three GEE models were controlled with antenatal depression.

3.4.3 Cox Proportional Hazards Regression Analysis

To investigate whether changes in particular measures of breastfeeding were associated with changes in EPDS score during antenatal and postpartum periods while controlling for potential confounding factors, three Cox Proportional Hazards Regression Analyses were conducted. Cox Proportional Hazards Regression Analysis was used to investigate whether changes in depressive symptoms were associated with changes in the major outcomes.

Calculating the difference in the major outcome variable in a regression model is a simple way to examine change. However, such analysis is vulnerable to the phenomenon of 'regression to the mean' where values that are extreme at first measurement tend to be closer to the centre of the distribution on subsequent measurements, making change highly related to the initial value (Twisk, 2003). Therefore, for each multiple linear regression model, the major outcome (Y_{i2}) was modelled with the major outcome (Y_{i1}) being included as an explanatory variable in the model. This approach known as 'analysis of covariance', is a method of examining change that more or less corrects for regression to the mean (Twisk, 2003). Using this method, change was defined relative to the value of Y and this relatively was expressed in the regression coefficient β_1, below

$$Y_{i2} = \beta_0 + \beta_1 Y_{i1} + \beta_2 X_{i1} + \beta j + l\, X_{ij} + \ldots\ldots\ldots + \varepsilon_i$$

Y_{i2} : observation for subject i at postpartum visits

Y_{i1} : observation for subject i at antenatal visit

ε_i : error for subject i

X_{ij} : j^{th} covariate for subject i

i : 1, ……, n

All significant variables and potential confounders were added to the model. Significance to the EPDS and other variables were examined using two model fitting strategies, i.e. the full model and the stepwise approach. Explanatory variables with two sided p-values less than 0.05 were considered significant. If inconsistencies in significant variables were evident between the two modelling strategies, hierarchical linear regression analysis was performed to ascertain whether the inclusion of a particular variable improved the fit of the model. For all the three final models, the stepwise method provided the best model fit and was reported in the results.

3.5 Ethical Considerations

Ethics clearance was granted by Curtin University Human Research Ethics Committee. This study was also approved by the Sabah State Health Department. Involvement in the study was fully explained to the participants and informed consent was obtained prior to recruitment. A duplicate copy of the consent form together with the Participant Information Form on the study was given to the participant. Participants were asked to voluntarily participate in this study and were able to withdraw from the study at any point of the study without prejudice. All information obtained was being kept confidential. No identifiable data were disclosed in any form prior to any person and reports of the results was for the purpose of this study only. All questionnaires were being kept in locked storage facilities for 7 years before disposal. Access is limited to the researcher only when necessary for working on the study.

CHAPTER 4: RESULTS

Overview

This chapter will present results of the bivariate and multivariate analysis of this study. The first section provides descriptive statistics of the results of the initial questionnaire. Results of bivariate analysis were put together with the descriptive statistics. In the multivariate analysis, each model and all the variables involved were stated.

4.1 Descriptive statistics

Initially, 2248 mothers were approached to participate in the study. However, 112 mothers declined for reasons including time constraints, privacy and or they simply did not want to participate. A total of 40 questionnaires were excluded from the analysis due to incompleteness of the data, and questionnaires were included in the analysis at antenatal. The total number of questionnaires analysed for each visit are shown in Table 4.1 below.

Table 4.1: Response rates

Visit	Number of respondents	Response rates
Antenatal	2072	92.17%
1 month	1598	77.12 %
3 months	1326	63.99 %
6 months	1184	57.14 %

The response rates decrease with time due to the non-attendance of mothers for postpartum follow-up and the difficulty of communications in some communities. Almost 60% of the mothers recruited in the antenatal period were interviewed at 6 months and a total of 942 mothers attended all the four interviews.

4.1.1 Differences between respondents and non-respondents

Table 4.2: Test of differences on age, education and ethnics between the antenatal and postpartum samples

	1 month	3 months	6 months
Age	5.252 (0.262)	3.414 (0.491)	6.767 (0.149)
Education	6.417 (0.170)	3.870 (0.424)	6.733 (0.151)
Ethnicity	0.470 (0.493)	0.492 (0.483)	1.094 (0.296)

Pearson Chi-square (p-value)

Comparisons have been made to test for differences on age, education and ethnicity between respondents who attended the antenatal and those who attended the 1 month, 3 months and 6 months visits. Table 4.2 showed that the postpartum samples did not significantly differ from the antenatal sample on these three variables.

The demographic characteristics of the sample are described in Table 4.3. Demographic factors were compiled from the data given by mothers who completed the initial questionnaire.

4.1.2 Demographic characteristics of the sample

Table 4.3: Demographic characteristics of the sample at recruitment

	Number	Percentage
Mother's age, years		
≤24	773	37.3
25-34	1113	53.7
≥35	186	9.0
Mother's Religion		
Islam	1330	64.2
Christian	690	33.3
Buddhist	52	2.5
Mother's Ethnic Group		
Local	1609	77.7
Non-local	463	22.3
Marital status		
Married and living with husband	1961	95.8
Married but not living with husband	64	3.1
Single	6	0.3
Divorced	16	0.8
Mother's education		
Never/primary	695	34.7
Secondary	1055	52.7
Tertiary	252	12.6
Father's education		
Never/primary	429	21.9
Secondary	1129	57.5
Tertiary	219	11.2
Not known	186	9.5
Mother's Occupation		
Housewife	1411	70.2
Work full time	451	22.4
Work part time	82	4.1
Self employed	65	3.2
Husband's Occupation		
Not working	28	1.5
Work full time	1348	70.0
Work part time	174	9.0
Self employed	375	19.5
Household Income		
< RM 1000	1387	68.3
RM 1001- RM 3000	512	25.2
RM 3001- RM 5000	112	5.5
>RM 5000	19	0.9

The majority of the mothers in the study are in the age group of 25-34 years old. Only 9% are above 35 years old. About 37% of the mothers were below 25 years of

age. Most of the mothers were married at an early age and report their occupation as 'housewives'. About 65% of the mothers are Muslims, and the next largest group are Christians (33.1%), with a small number of Buddhists (2.5%). In this study, in terms of ethnic group, all the mothers were divided into local and non-locals. The locals referred to all Sabah ethnic minority groups whereas the non-locals include mothers belonging to groups originally of Indonesian origin, Filipinas, Malays, Chinese or Indian. About 78% of the mothers were locals and 22% were non-locals. Almost all of the mothers (96%) were married and only 6 were single or unmarried. About half of the mothers had completed secondary school and 13% had tertiary education. Similar to the mothers, more than half of their husband/partners had completed secondary education. Occupation was reported as housewives by 70% of the mothers while 22.4% were in fulltime employment. 70% of the husbands were fulltime workers and it was interesting to note that there were about 28 (1.5%) of the husbands who were unemployed. Majority (68%) of the mothers were from the lowest income group (monthly income of less than RM 1000) and only 1% of the mothers had a monthly income of more than RM5000.

4.1.3 Factors associated with breastfeeding

Table 4.4: Breastfeeding initiation by broad ethnic group

	Local	Non-local	Total
Initiated breastfeeding	969 (95.8%)	535 (95.2%)	1504 (95.6%)
No breastfeeding initiation	43 (4.2%)	27 (4.8%)	70 (4.4%)
Total	1012	562	1574

The overall breastfeeding initiation rate was 95.6%. The rate of breastfeeding initiation was the same for the locals and the non-locals. This showed that 4.4% of the mothers did not initiate breastfeeding.

Table 4.5: Type of prelacteal feed by broad ethnic group

	Local	Non-local	Total
Infant formula	32 (74.4%)	15 (55.6%)	47 (67.1%)
Plain water or glucose water	11 (25.6%)	12 (44.4)	23 (32.9%)
Total	43	27	70

Infant formula was the main prelacteal feed given (67.1%) compared to plain water or glucose water (32.9%). More of the local women gave infant formula (74.4%) to their babies compared to the non-locals (55.6%).

Table 4.6: Infant feeding pattern at 1 month, 3 months and 6 months

	1 month	3 months	6 months
Full breastfeeding	1067 (67.2%)	652 (49.8%)	426 (36.1%)
Any breastfeeding	1522 (95.9%)	1155 (88.2%)	952 (80.7%)
Formula-feeding	65 (4.1%)	156 (11.9%)	227 (19.3%)

Table 4.6 above shows that 67.2% mothers were fully breastfeeding and 95.9% were practising ‘any breastfeeding’ at 1 month. The percentage reduced to 49.8% and 36.1% at 3 months and 6 months respectively. The percentage of ‘any breastfeeding’ also decreased with increasing months. However, formula-feeding increases from 4.1% at 1 month to about 12% at 3 months and 19% at 6 months.

4.1.4 Mothers' IOWA Infant Feeding Attitude Scale

Table 4.7: Mothers IIFAS item responses at the antenatal interview

Attitude Item	Percentages				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. The nutritional benefits of breast-milk last only until baby is weaned	21.2	15.9	20.3	15.9	26.7
b. Formula feeding is more convenient than breastfeeding	31.5	26.8	23.1	7.0	11.5
c. Breastfeeding increases mother-infant bonding	2.7	1.0	2.5	11.3	82.6
d. Breastmilk is lacking in iron	51.3	22.7	11.8	3.7	10.6
e. Formula fed babies are more likely to be overfed than breastfed babies	25.2	23.7	26.5	10.8	13.7
f. Formula feeding is the better choice if the mother works outside the home	10.3	22.3	32.2	15.5	19.7
g. Mothers who formula feed miss one of the great joys of motherhood	16.1	22.0	21.9	14.5	25.5
h. Women should not breastfeed in public places such as restaurants	31.0	27.9	19.2	8.7	13.3
i. Babies who are fed breastmilk are healthier	3.2	3.2	12.0	20.3	61.2
j. Breastfed babies are more likely to be overfed	7.1	8.5	21.9	20.6	41.9
k. Fathers feel left out if a mother breastfeeds	46.4	28.5	15.8	3.5	5.7
l. Breastmilk is the ideal food for babies	2.2	0.9	2.9	12.8	81.2
m. Breastmilk is more easily digested than formula	3.3	1.5	9.3	20.0	65.9
n. Formula is as healthy for an infant as breast milk	25.9	28.9	22.6	6.5	16.3
o. Breastfeeding is more convenient than formula feeding	2.5	1.9	11.4	23.3	61.0
p. Breastmilk is less expensive than formula	1.5	1.0	6.2	18.5	72.8
q. A mother who drinks occasionally should not breastfeed	11.5	8.3	17.5	15.6	47.1

Table 4.8: Mothers IIFAS item responses at the 3 months interview

Attitude Item	Percentages				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. The nutritional benefits of breast-milk last only until baby is weaned	22.5	16.2	25.2	10.4	25.8
b. Formula feeding is more convenient than breastfeeding	33.2	29.3	20.6	5.2	11.7
c. Breastfeeding increases mother-infant bonding	4.4	0.9	3.1	13.6	78.0
d. Breastmilk is lacking in iron	48.7	26.3	13.0	2.3	9.7
e. Formula fed babies are more likely to be overfed than breastfed babies	22.0	20.6	27.4	12.3	17.7
f. Formula feeding is the better choice if the mother works outside the home	11.3	15.1	32.3	18.2	23.1
g. Mothers who formula feed miss one of the great joys of motherhood	19.6	22.3	21.6	10.8	25.8
h. Women should not breastfeed in public places such as restaurants	30.9	32.3	16.2	6.5	14.1
i. Babies who are fed breastmilk are healthier	6.3	2.2	15.7	27.6	48.3
j. Breastfed babies are more likely to be overfed	8.8	4.6	18.1	28.4	40.0
k. Fathers feel left out if a mother breastfeeds	50.9	32.4	9.9	2.5	4.3
l. Breastmilk is the ideal food for babies	2.9	0.9	4.2	22.6	69.4
m. Breastmilk is more easily digested than formula	6.2	1.8	15.8	24.0	52.3
n. Formula is as healthy for an infant as breast milk	28.1	26.5	24.9	6.3	14.1
o. Breastfeeding is more convenient than formula feeding	2.2	1.7	10.0	28.3	57.7
p. Breastmilk is less expensive than formula	1.4	1.1	4.7	21.5	71.2
q. A mother who drinks occasionally should not breastfeed	11.9	12.2	12.1	12.6	51.1

Table 4.9: Mothers IIFAS item responses at the 6 months interview

Attitude Item	Percentages				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. The nutritional benefits of breast-milk last only until baby is weaned	23.5	13.8	23.6	8.8	30.2
b. Formula feeding is more convenient than breastfeeding	37.7	30.2	18.8	2.9	10.3
c. Breastfeeding increases mother-infant bonding	4.2	0.5	12.9	10.2	82.3
d. Breastmilk is lacking in iron	51.4	26.3	10.5	1.4	10.4
e. Formula fed babies are more likely to be overfed than breastfed babies	19.4	19.8	28.7	8.0	24.1
f. Formula feeding is the better choice if the mother works outside the home	11.2	11.4	39.6	12.5	25.3
g. Mothers who formula feed miss one of the great joys of motherhood	20.2	23.4	19.2	8.8	28.3
h. Women should not breastfeed in public places such as restaurants	28.7	34.0	13.7	5.0	18.6
i. Babies who are fed breastmilk are healthier	8.6	1.5	14.9	30.1	44.9
j. Breastfed babies are more likely to be overfed	10.0	3.0	15.5	30.5	40.9
k. Fathers feel left out if a mother breastfeeds	57.7	32.8	6.5	1.3	1.8
l. Breastmilk is the ideal food for babies	2.4	0.6	4.0	20.2	72.7
m. Breastmilk is more easily digested than formula	8.0	1.6	13.6	25.9	50.8
n. Formula is as healthy for an infant as breast milk	35.7	24.0	21.9	5.8	12.7
o. Breastfeeding is more convenient than formula feeding	2.4	0.9	7.7	29.9	59.0
p. Breastmilk is less expensive than formula	1.5	0.7	3.6	19.9	74.3
q. A mother who drinks occasionally should not breastfeed	10.0	16.2	9.7	11.0	53.1

Table 4.7, 4.8 and 4.9 show the mothers' responses (percentages) for each item in the IIFAS. Interestingly, at the antenatal interview, 61.2% mothers strongly agreed that 'babies who are fed breastmilk are healthier'. However, at the 3 months and 6 months visits, the percentage of mothers who strongly supported this statement had declined to 48.3% and 44.9% respectively. Comparing the antenatal visit and the 3 months postpartum visit, 49.8% mothers did not change their minds about this particular statement. From the 3 months to the 6 months visit, 64% of the mothers did not change their minds about the particular statement.

At all visits, about 50% mothers strongly disagreed to the statement 'breastmilk is lacking in iron'. At all the visits, the highest percentage for 'neutral' response were for the statement 'formula feeding is the better choice if the mother works outside the home'. Also at all visits, 40-42% mothers strongly agreed that breastfed babies are more likely to be overfed than formula-fed babies. Additionally, 92-94% of the mothers 'agreed' and 'strongly agreed' that 'breastmilk is the ideal food for babies'.

Table 4.10: Mothers IOWA Infant Feeding Attitude Scale (IIFAS) group by visits

	Local	Non-local	Total	p-value
Visit				
Antenatal				
<65	1331 (84.3)	391 (85.6)	1722 (84.6)	0.528
≥65	247 (15.7)	66 (14.4)	313 (15.4)	
Total	1578	457	2035	
3 months				
<65	796 (78.4)	239 (87.9)	1035 (85.5)	0.202
≥65	143 (21.6)	33 (12.1)	176 (14.5)	
Total	939	272	1211	
6 months				
<65	630 (79.8)	199 (85.4)	829 (81.1)	0.057
≥65	159 (20.2)	34 (14.6)	193 (18.9)	
Total	789	233	1022	

Chi-square test with p-value

There were no significant associations between IIFAS group and the locals and non-locals at the antenatal, 3 months and 6 months visits.

Table 4.11: IIFAS group at antenatal interview and by IIFAS group at 3 months postpartum (all mothers)

IIFAS Group Antenatal		IIFAS Group 3months		
		<65	≥65	Total
	<65	876 (86.1%)	125 (71.4%	1001 (84.0%)
	≥65	141 (13.9%)	50 (28.6%)	191 (16.0)
	Total	1017	175	1192

Pearson Chi-square=24.001; p-value=<0.001

Table 4.11 above shows that there was a significant difference between IIFAS group at antenatal and IIFAS group at 3 months.

Table 4.12: IIFAS group at antenatal by IIFAS group at 6 months (all mothers)

IIFAS Group Antenatal		IIFAS Group 6 months		
		<65	≥65	Total
	<65	714 (87.7%)	130 (67.7%)	844 (83.9%)
	≥65	100 (12.3%)	62 (32.3%)	162 (16.1%)
	Total	814	192	1006

Pearson Chi-square=46.027; p-value=<0.001

Table 4.12 above shows that there was a significant difference between IIFAS group at antenatal and IIFAS group at 6 months. The mothers' opinions and knowledge of breastfeeding changed with the experience of birth and breastfeeding.

Table 4.13: IIFAS group at antenatal by IIFAS group at 3 months (mothers who attended all the four interviews)

IIFAS Group Antenatal		IIFAS Group at 3 months		
		<65	≥65	Total
	<65	668 (86.4%)	109 (72.7%)	777 (84.2%)
	≥65	105 (13.6%)	41 (27.3%)	146 (15.8%)
	Total	773	150	923

Pearson Chi-square=17.836; p=<0.001

Table 4.13 above shows that there was a significant difference between IIFAS group at antenatal and IIFAS group at 3 months. Respondents were mothers who attended all the four interviews.

Table 4.14: IIFAS group at antenatal by IIFAS group at 6 months (mothers who attended all the four interviews)

IIFAS Group Antenatal		IIFAS Group at 6 months		
		<65	≥65	Total
	<65	652 (87.9%)	123 (69.1%)	775 (84.2%)
	≥65	90 (12.1%)	55 (30.9%)	145 (15.8%)
	Total	742	178	920

Pearson Chi-square=38.093; p=<0.001

Table 4.14 above shows that there was a significant difference between IIFAS group at antenatal and IIFAS group at 6 months. Respondents were mothers who attended all the four interviews.

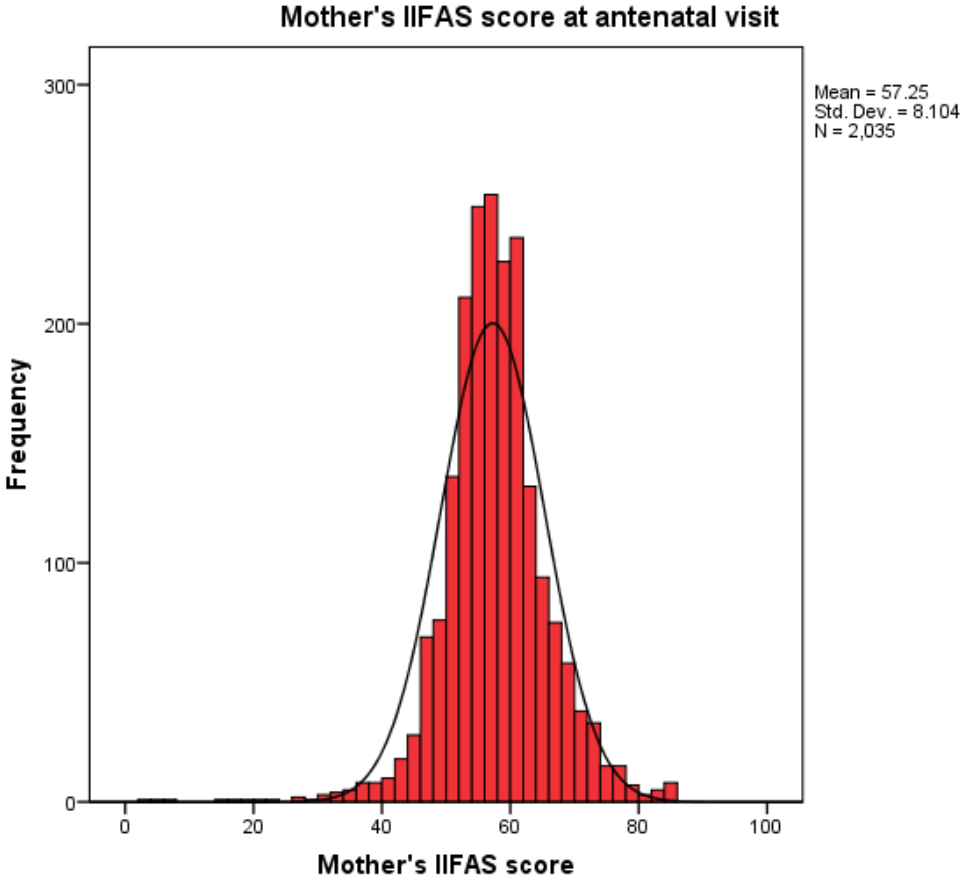

Figure 4.1: Histogram of Mother's IIFAS Score at antenatal visit

The above graph shows the total IIFAS Score at antenatal. The mean score was 57.25±8.104.

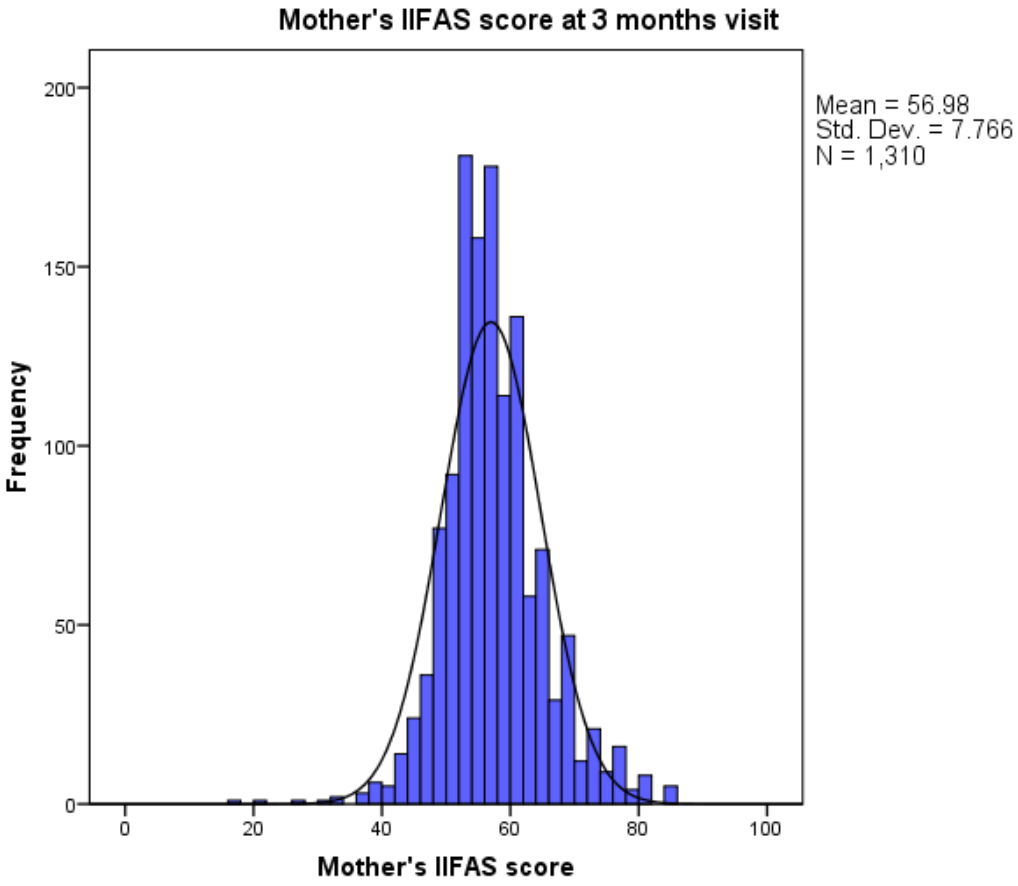

Figure 4.2: Histogram of Mother's IIFAS Score at 3 months visit

Graph 4.2 above shows the distribution of total IIFAS scores at 3 months postpartum. The mean score was 56.98. The graph was normally distributed between the scores of 40 to 80.

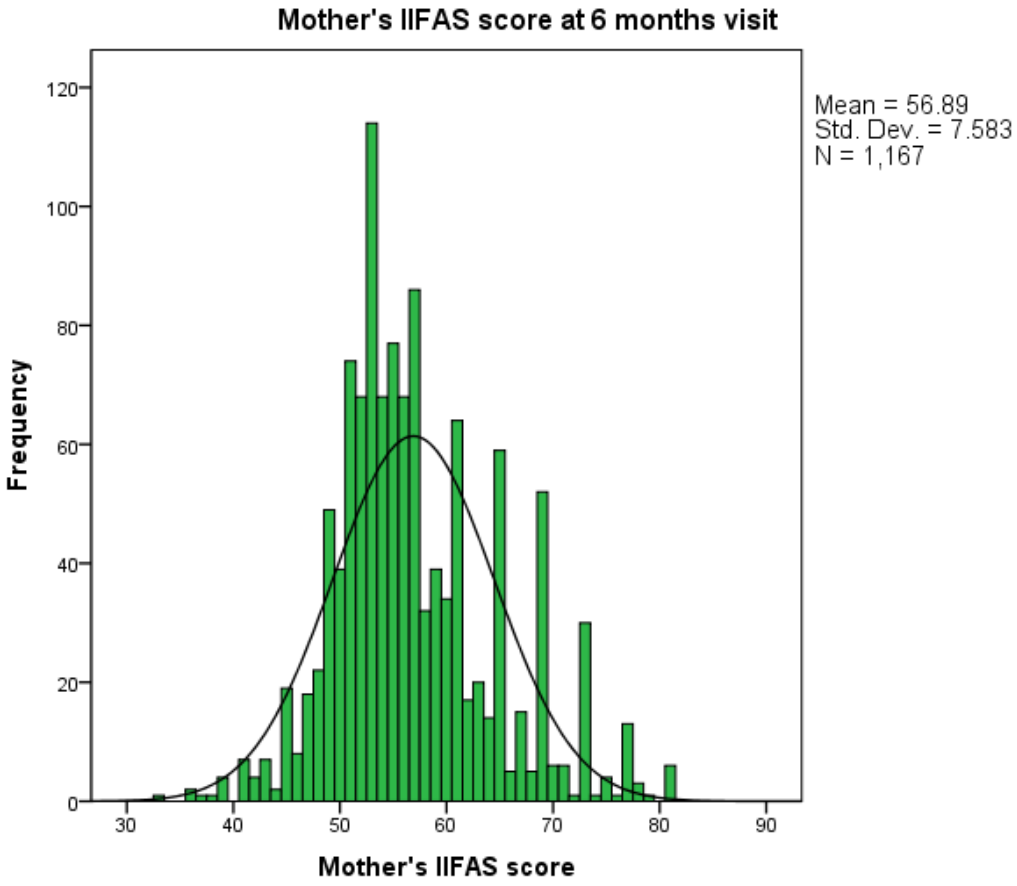

Figure 4.3: Histogram of Mother's IIFAS Score at 6 months visit

Figure 4.3 above shows the distribution of total IIFAS scores at 6 months postpartum. The mean score was 56.89±7.583. The mode was at the score of 53.

Table 4.15: Correlation between IIFAS scores and duration of ‘full breastfeeding’

IIFAS Score	Duration of ‘full breastfeeding’	Pearson correlation	p-value
At 3 months	3 months	0.068	0.048
	6 months	0.119	0.000
At 6 months	6 months	0.088	0.006

Table 4.16: Correlation between IIFAS scores and duration of ‘any breastfeeding’

IIFAS Score	Duration of ‘ any breastfeeding’	Pearson correlation	p-value
3 months	3 months	0.035	0.230
6 months	6 months	0.035	0.234

Table 4.15 and table 4.16 above shows that there was a significant correlation between IIFAS Scores and duration of ‘full breastfeeding’. However, there was no correlation between IIFAS score and duration of ‘any breastfeeding’.

Table 4.17: Changes in IIFAS Score from antenatal to 3 months in 3 groups

	Frequency	Percentage
Increase score	251	21.1
About the same score	625	52.4
Decrease	316	26.5
Total	1192	100

Table 4.17 above shows that about half of the mothers had similar IIFAS scores at antenatal and 3 months. 26.5% had a decrease in the scores while 21.1% had an increment in their IIFAS scores. The mean was 0.57±10.055.

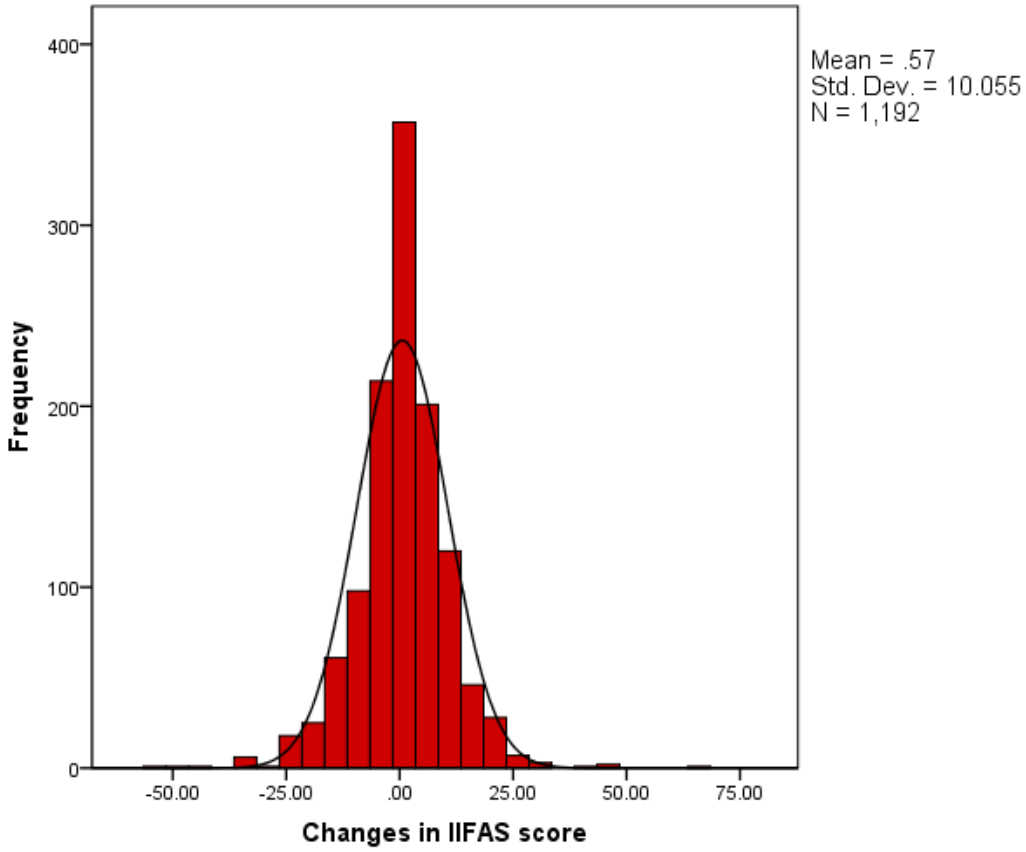

Figure 4.4: Histogram of the changes in IIFAS scores from antenatal to 3 months

Table 4.18: Changes in mothers' IIFAS Score from antenatal to 6 months in 3 groups

	Frequency	Percentage
Increase score	216	21.5
About the same score	516	51.3
Decrease score	274	27.2
Total	1006	100

The changes in IIFAS scores from antenatal to 6 months were similar to the changes from antenatal to 3 months. The mean was 0.22±10.185.

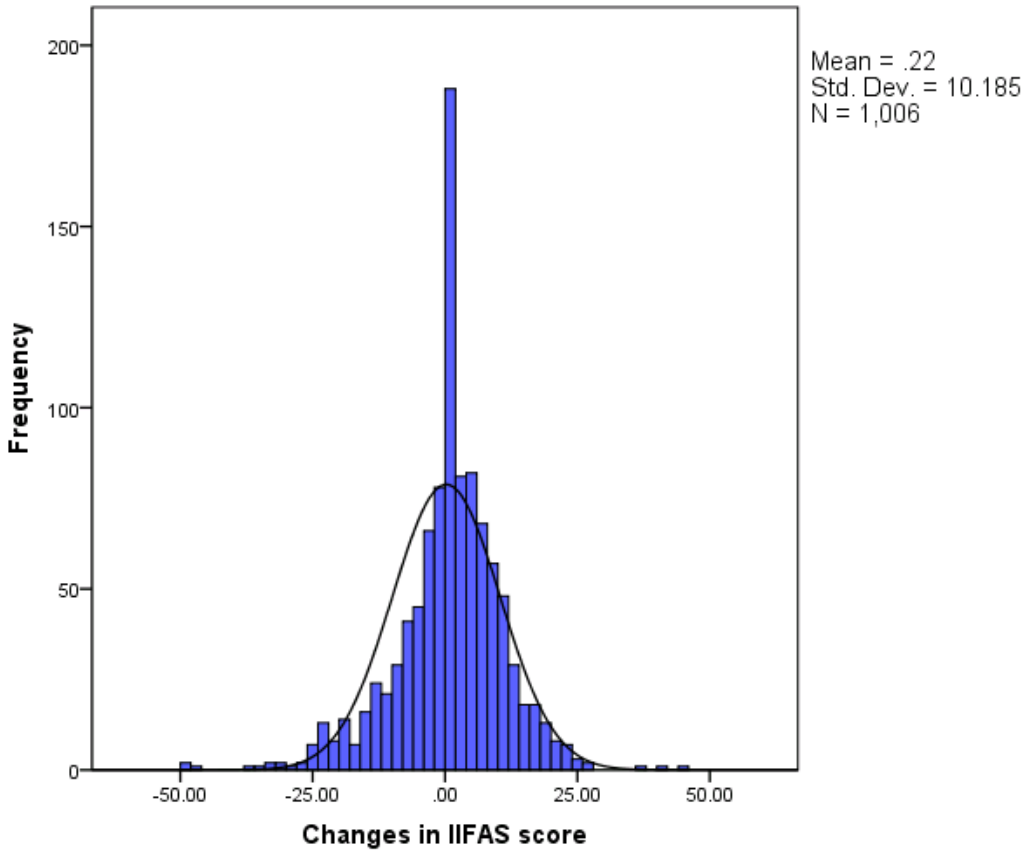

Figure 4.5: Histogram of the changes in IIFAS scores from antenatal to 6 months

4.1.5 Edinburgh Postpartum Depression Scale

Table 4.19: Results of Edinburgh Postpartum Depression Scale at each visit

Visit	No depressive symptoms	With depressive symptoms	Total
Antenatal	1787 (862%)	285 (13.8%)	2072
1 month	1451 (92.4%)	120 (7.6%)	1571
3 months	1219 (92.8%)	94 (7.2%)	1313
6 months	1073 (92.0%)	93 (8.0%)	1166

Table 4.19 above shows that at recruitment (antenatal visit), 13.8% mothers had depressive symptoms. The percentage of mothers with depressive symptoms reduced to 7.6% at 1 month postpartum and 7.2% at 3 months postpartum. The percentage remained constant at 6 months postpartum.

Table 4.20: Results of Edinburgh Postpartum Depression Scale at each visit by mothers who attended all the four interviews

Visit	No depressive symptoms	With depressive symptoms
Antenatal	812 (86.2%)	130 (13.8%)
1 month	880 (93.4%)	62 (6.6%)
3 months	875 (92.9%)	67 (7.1%)
6 months	871 (92.5%)	71 (7.5%)

Table 4.20 above shows that at recruitment (antenatal visit), 13.8% mothers had depressive symptoms. The percentage of mothers with depressive symptoms reduced to 6.6% at 1 month postpartum and 7.1% at 3 months postpartum. The percentage remained similar at 7.5% at 6 months postpartum.

Table 4.21: Number of visits when mothers were classified as depressed by the EPDS (mothers who attended all the four interviews)

	Frequency	Percentage
Never been depressed	701	74.4
One visit	175	18.6
Two visits	48	5.1
Three visits	13	1.3
Four visits	5	0.5
Total	942	100

Among the 942 mothers who attended all the 4 interviews, 25.5% of them were screened as having been depressed at least once.

Table 4.22: Changes in EPDS Scores from antenatal to postpartum

	Antenatal to 1 month	1 month to 3 months	3 months to 6 months
Increased in EPDS group	104 (11.0%)	127 (13.5%)	90 (9.6%)
Same EPDS group	642 (68.2%)	717 (76.1%)	771 (81.8%)
Decreased in EPDS group	196 (20.8%)	98 (10.4%)	81 (8.6%)
Total	942	942	942

The table above shows the changes in EPDS Scores from antenatal to 1 month, 1 month to 3 months and 3 months to 6 months among mothers who attended all the 4 interviews. From the antenatal interview to 1 month postpartum, 20.8% of the mothers had a decreased EPDS score and 11% increased their EPDS scores. More mothers decreased in EPDS from antenatal to 1 month (20.8%) compared to the other 2 groups (1 month to 3 months (10.4%) and 3 months to 6 months (8.6%)). This shows that depression among these mothers improves after giving birth.

It also shows that more mothers became more depressed in the EPDS Scores from 1 month to 3 months (13.5%) compared to the antenatal to 1 month EPDS Scores (11%) and the 3 months to 6 months group (9.6%). There could be many contributory factors involved. It could be that these mothers are returning to work, have less social support compared to the support received previous or childcare demand.

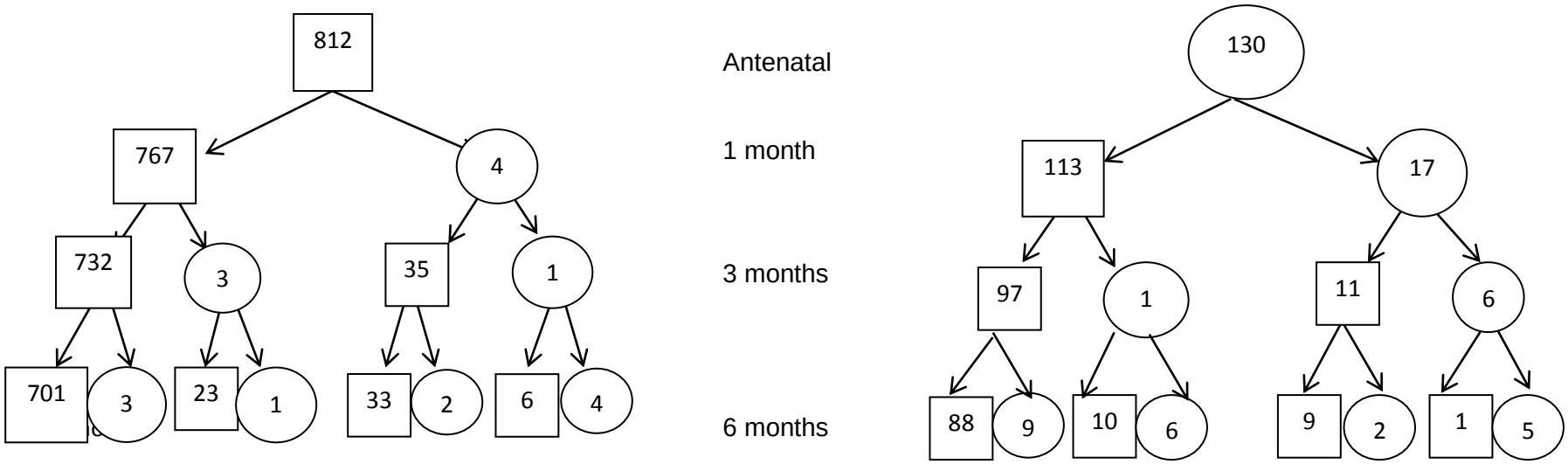

Figure 4.6: Flow chart of the EPDS groups of the 942 mothers who attended all the four measurements. The squares represent the number of respondents without the depressive symptoms and the circle represents the number of respondents with depressive symptoms. The above diagram shows that more mothers (13.8%) were depressed during antenatal than any of the postpartum periods. Among 130 mothers who were depressed at antenatal, only 17 were depressed at 1 month. Among those who were not depressed at antenatal, 45 mothers became depressed at 1 month postpartum. 35 mothers who were not depressed before became depressed at 3 months. 31 mothers who were not depressed at any of the earlier measurements became depressed at 6 months. In total 71 mothers were depressed at 6 months.

Table 4.23: EPDS Group by type of feed at each visits

Type of feed	1 month EPDS		3 months EPDS		6 months EPDS	
	<12	≥12	<12	≥12	<12	≥12
Full breastfeeding	969 (67.3)	76 (63.3)	549 (46.3)	38 (41.3)	349 (32.6)	23 (24.7)
Any breastfeeding	417 (96.3)	37 (94.1)	485 (87.2)	39 (83.7)	495 (78.9)	44 (72.0)
Formula feeding	54 (3.8)	7 (5.8)	153 (12.9)	15 (16.3)	225 (21.0)	26 (28.0)
Total	1440	120	1187	92	1069	93

The table above shows that at all the visits, among the mothers who were on formula-feeding, there were more mothers who scored 12 or above on the EPDS compared to mothers who scored less than 12. Conversely, there were less mothers with EPDS≥12 in the 'full breastfeeding' group compared with those with EPDS<12.

Table 4.24: Type of feed at 6 months by changes in EPDS Scores from one month to 6 months

	Full breastfeeding	Any breastfeeding	Formula-feeding	Total
Increased EPDS Scores	28 (9.9%)	85 (18.7%)	33 (16.5%)	146
About the same Scores	230 (81.0%)	312 (68.6%)	139 (69.5)	681
Decreased EPDS Scores	26 (9.2%)	58 (12.7%)	28 (14.0%)	112
Total	284	455	172	939

Pearson Chi-square=15.744 df=4 p-value=0.003

There is a significant association between the changes in EPDS Scores from one month to 6 months with the type of feed of the baby. This finding is in mothers who attended all the four interviews. The table shows that only 9.9% mothers who were fully breastfeeding had an increase in EPDS Scores compared to mothers who were practising 'any breastfeeding' (18.7%) and formula-feeding (16.5%). This suggested

that ‘full breastfeeding’ has a protective role in the development of postpartum depression or in other words, mothers who breastfeed are less depressed.

The table also shows that mothers who are fully breastfeeding have the most stable EPDS Scores (81.0%) compared to mothers who are practicing ‘any breastfeeding’ or who are giving formula.

Table 4.25: Socio-demographic characteristics of subjects by EPDS Groups at antenatal

	Overall	Non-depressed	Depressed	p-value
Mother's age, y				
<24	773	657 (85.0)	116 (15.0)	0.407
25-34	1113	950 (54.0)	141 (49.8)	
≥35	186	160 (86.0	26 (14.0)	
Mother's religion				
Islam	1330	1165 (87.6)	165 (12.4)	0.056
Christian	690	579 (83.9)	111 (16.1)	
Buddhist	52	43 (82.7	9 (17.3)	
Mother's ethnic				
Local	1609	1383 (86.0)	226 (14.0)	0.473
Non-local	463	404 (87.3)	59 (12.7)	
Marital status				
Married	1960	1703 (86.9)	257 (13.1)	**0.003**
Single/not living with husband/divorced	87	66 (75.9)	21 (24.1)	
Marriage duration				
<2 years	670	570 (85.1)	100 (14.9)	0.201
2-5 years	611	533 (87.2)	78 (12.8)	
6-10 years	394	353 (89.6)	41 (10.4)	
>10 years	297	256 (86.2)	41 (13.8)	
Mother's education				
Never/primary	693	613 (88.5)	80 (11.5)	**0.034**
Secondary	1055	889 (84.3)	166 (15.7)	
Tertiary	252	221 (87.7)	31 (12.3)	
Father's education				
Never/primary	429	371 (21.8)	58 (21.9)	0.197
Secondary	1129	964 (56.8)	165 (62.3)	
Tertiary	219	197 (11.6)	22 (8.3)	
Not known	186	166 (9.8)	20 (7.5)	
Mother's Occupation				
Housewife	1409	1224 (86.9)	185 (13.1)	0.459
Work full time	451	393 (87.1)	58 (12.9)	
Work part time	82	68 (82.9)	14 (17.1)	
Self employed	65	53 (81.5)	12 (18.5)	
Husband's Occupation				
Not working	28	23 (82.1)	5 (17.9)	0.247
Work full time	1347	1179 (87.5)	168 (12.5)	
Work part time	173	153 (88.4)	20 (11.6)	
Self employed	375	315 (84.0)	60 (16.0)	
Household Income				
<1000	1385	1188 (85.8)	197 (14.2)	0.234
1001-3000	512	450 (87.9)	62 (12.1)	
3001-5000	131	118 (90.1)	13 (9.9)	

Chi-square tests with p-value Data are n (%)

From the Chi-square test conducted, significant differences existed between marital status and the three education level in relation to depression. The percentage of married women who were depressed was significantly higher than the single/not living with husband/divorced women. There was a significant difference in terms of education levels among the depressed and non-depressed mothers. Other demographic factors were not statistically significant.

4.2 Bivariate Analysis

4.2.1 Variables at antenatal visit

Table 4.26: Results for Chi-square test for variables at antenatal visit

	Overall	Non-depressed	Depressed	p-value
How baby would be fed				**0.020**
Breastfeeding only	1287	1134 (63.7)	154 (54.3)	
Formula-feeding only	33	26 (1.5)	7 (2.5)	
Mainly breastfeeding but also formula-feeding	664	555 (31.2)	109 (38.7)	
Mainly formula-feeding but also breastfeeding	78	65 (3.7)	13 (4.6)	
Total	2062	1780	282	
When first decide how baby would be fed				**<0.001**
Before pregnancy	667	595 (33.7)	72 (25.5)	
Early in the pregnancy	716	631 (35.7)	85 (30.1)	
Later in the pregnancy	121	102 (5.8)	19 (6.7)	
During labour	118	89 (5.0)	29 (10.3)	
After baby is born	428	351 (19.9)	77 (27.3)	
Total	2050	1768	282	
Baby's father preference				0.065
Prefers breastfeeding	1356	1181 (66.7)	175 (62.9)	
Prefers formula-feeding	57	46 (2.6)	12 (4.0)	
Does not mind how I feed the baby	445	372 (21.0)	73 (26.3)	
Never really discussed the matter with him	190	171 (9.7)	19 (6.8)	
Total	2048	1770	278	

Table 4.26: Results for Chi-square test for variables at antenatal visit (cont.)

	Overall	**Non-depressed**	**Depressed**	**p-value**
If breastfeeding when plan to stop				**<0.001**
< 6 months	307	238 (13.8)	69 (25.1)	
7-12 months	295	246 (14.2)	49 (17.8)	
> 12 months	995	880 (50.9)	115 (41.8)	
As long as I could	406	364 (21.1)	42 (15.3)	
Total	2003	1728	275	
When plan to start solids				**0.011**
< 6 months	1630	1405 (79.2)	225 (79.5)	
7-12 months	261	237 (13.4)	24 (8.5)	
>12 months	20	16 (0.9)	4 (1.4)	
others	145	115 (6.5)	30 (10.6)	
Total	2056	1773	283	
Satisfaction with marriage				**<0.001**
No	54	38 (2.2)	16 (5.9)	
Yes	1973	1715 (97.8)	257 (94.1)	
Total	2026	1753	273	
On family planning				**0.018**
No	1314	1149 (66.8)	165 (59.6)	
Yes	682	570 (33.2)	112 (40.4)	
Total	1996	1719	277	
Mother happy with the pregnancy				**0.001**
No	63	45 (2.6)	18 (6.4)	
Yes	1981	1718 (97.4)	263 (93.6)	
Total	2044	1763	281	

Table 4.26: Results for Chi-square test for variables at antenatal visit (cont.)

	Overall	Non-depressed	Depressed	p-value
If the pregnancy a planned one				**<0.001**
No	873	708 (40.3)	165 (58.5)	
Yes	1165	1049 (59.7)	117 (41.5)	
Total	2039	1757	282	
Any worries during pregnancy				**<0.001**
No	1450	1319 (76.1)	131 (46.8)	
Yes	564	415 (23.9)	149 (53.2)	
Total	2014	1734	280	
Overall feeling during pregnancy				**<0.001**
Most of the time happy	1729	1558 (91.9)	169 (65.3)	
Most of the time worried	98	65 (3.8)	33 (12.7)	
Most of the time sad	9	2 (0.1)	7 (2.7)	
Most of the time depressed	45	15 (0.9)	30 (11.6)	
Mixed feeling	76	56 (3.3)	20 (7.7)	
Total	1955	1696	259	
Problems during pregnancy*				**<0.001**
No problem	1403	1305 (73.0)	98 (34.4)	
1-3 problems	615	459 (25.7)	156 (54.7)	
≥ 4 problems	54	23 (1.3)	31 (10.9)	
Total	2072	1787	285	
If the problems were settled*				**<0.001**
No	314	230 (43.6)	84 (46.2)	
Yes	396	298 (56.4)	98 (53.8)	
Total	710	528	182	

Chi-square tests with p-value of significant variables Data are n (%)

Table 4.26 above shows the results of bivariate analysis (chi-square test) of all the variables n the antenatal questionnaires. The variables are ‘baby’s feeding intention’, ‘when first decide of baby’s type of feed’, ‘baby’s father preference’, ‘plan to stop breastfeeding’, ‘plan to start solids’, ‘satisfaction with marriage’, ‘on family planning’, ‘mother’s feeling towards pregnancy’, ‘planned pregnancy’, ‘worry during pregnancy’, ‘overall feeling during pregnancy’ and ‘problems during pregnancy’. There was a statistically significant difference between the mothers with depressive symptoms and those without depressive symptoms in all variables except for ‘baby’s father’s preferences in the type of feed’. About 63.7% of the mothers without depressive symptoms intended to breastfeed. This was statistically significantly ($p=0.02$) higher than other types of baby’s feed. Half of the mothers without depressive symptoms planned to breastfeed for longer than a year ($p<0.001$). More of the mothers without depressive symptoms were satisfied with their marriage (97.8%), not on family planning (60.8%), happy with the pregnancy (97.4%), planned the pregnancy (59.7%), had no worries during pregnancy (76.1%), most of the time happy (91.9%) and had no problems during pregnancy (73%).

4.2.2 Variables at 1 month, 3 months and 6 months visit

Results of the Chi-square test of the variables which were statistically significant were listed in the tables below. Other variables were included as appendices.

Table 4.27: Results of Chi-square tests for 1 month variables

	EPDS<12	EPDS≥12	Total	p-value
Anybody made you feel guilty for not breastfeeding for longer				
No	65 (90.3)	7 (9.7)	72	**0.023**
Yes	12 (75.0)	4 (25.0)	16	
Did you get practical/emotional support during confinement?				
No	109 (87.9)	15 (12.1)	124	0.05
Yes	1271 (92.8)	99 (7.2)	1370	
Did your husband help you to take care of the baby?				
No	45 (70.3)	19 (29.7)	64	**<0.001**
Yes	1394 (93.6)	95 (6.4)	1489	
If yes, how often				
Always	942 (94.6)	54 (5.4)	996	**<0.001**
Sometimes	377 (91.3)	36 (8.7)	413	
Seldom	77 (86.5)	12 (13.5)	89	
Never	27 (77.1)	8 (22.9)	35	
How often husband helped with the housework?				
Always	887 (94.6)	51 (5.4)	938	**<0.001**
Sometimes	400 (91.1)	39 (8.9)	439	
Seldom	113 (89.0)	14 (11.0)	127	
Never	36 (76.6)	11 (23.4)	47	
Are you satisfied with your husband's help during confinement				
No	80 (80.0)	20 (20.0)	100	**<0.001**
Yes	1347 (93.7)	91 (6.3)	1438	
How is your relationship with your husband/partner?				
Good	1423 (92.9)	108 (7.1)	1531	**<0.001**
Not good	16 (64.0)	9 (36.0)	25	
Are you happy with the relationship?				
No	17 (53.1)	15 (46.9)	32	**<0.001**
Yes	1420 (93.3)	102 (6.7)	1522	
Do you have any problem with childcare during confinement?				
No	1204 (93.1)	89 (6.9)	1293	**0.011**
Yes	232 (88.5)	30 (11.5)	262	

Table 4.27: Results of Chi-square tests for 1 month variables(cont.)

	EPDS<12	EPDS≥12	Total	p-value
Are you constantly worried about the baby?				
No	656 (95.2)	33 (4.8)	689	**<0.001**
Yes	752 (90.1)	83 (9.9)	835	
Have you been depressed before?				
No	1160 (95.5)	55 (4.5)	1215	**<0.001**
Yes	269 (81.5)	61 (18.5)	330	
Did you feel sad unnecessarily within first week after childbirth?				
No	1292 (94.7)	73 (5.3)	1365	**<0.001**
Yes	112 (71.8)	44 (28.2)	156	
Do you have any problem which haunts you most of the time?				
No	1252 (94.8)	68 (5.2)	1320	**<0.001**
Yes	184 (78.3)	51 (21.7)	235	
Are you happy with the pregnancy?				
No	29 (90.6)	3 (9.4)	32	0.708
Yes	1399 (92.4)	115 (7.6)	1514	
Was the pregnancy an unplanned /unwanted one?				
No	962 (92.9)	74 (7.1)	1036	0.202
Yes	455 (91.0)	45 (9.0)	500	
Did you have emotional problem during the last pregnancy?				
No	1226 (94.8)	67 (5.2)	1293	**<0.001**
Yes	182 (78.1)	51 (21.9)	233	
Did you have any concern/worries during the previous pregnancy?				
No	1125 (94.9)	60 (5.1)	1185	**<0.001**
Yes	245 (81.4)	56 (18.6)	301	
Have you had any major stresses, changes or losses in the course of this pregnancy (separation, moving house, domestic violence, bereavement)?				
No	1324 (93.4)	94 (6.6)	1418	**<0.001**
Yes	82 (77.4)	24 (22.6)	106	

Table 4.27: Results of Chi-square tests for 1 month variables (cont.)

	EPDS<12	EPDS≥12	Total	p-value
Generally consider yourself a worrier?				
No	581 (95.7)	26 (4.3)	607	**<0.001**
Yes	825 (90.2)	90 (9.8)	915	
Generally like yourself as a person?				
No	88 (86.3)	14 (13.7)	102	**0.015**
Yes	1328 (92.9)	102 (7.1)	1430	
Food taboos during confinement?				
No	998 (93.4)	71 (6.6)	1069	**0.035**
Yes	427 (90.3)	46 (9.7)	473	
Were you confined in the house only?				
No	895 (93.6)	61 (6.4)	956	**0.016**
Yes	528 (90.3)	57 (9.7)	585	
Feel about the confinement practices?				
Good	1034 (93.7)	70 (6.3)	1104	**0.010**
Bad	110 (90.9)	11 (9.1)	121	
Neutral	282 (88.7)	36 (11.3)	318	
Do you think the practices help you regain health?				**0.027**
No	90 (91.8)	8 (8.2)	98	
Yes	1023 (93.4)	72 (6.6)	1095	
Don't know	318 (89.1)	39 (10.9)	357	

Table 4.27 lists the results of the bivariate analysis for some of the variables at the 1 month visit. A more detail table is included in Appendix F. In this study, the Chi-square tests shows that 'husband helps take care of baby', 'husband helps with the housework', 'satisfaction with husband's help during confinement', 'relationship with husband', 'happy with relationship with husband', 'problem with childcare during confinement', 'constantly worried about baby', 'previous depression', 'postpartum blues', 'have problems most of the time', 'have emotional problem during last pregnancy', 'major life events', 'low self-esteem', 'food taboos during confinement', 'confined in the house only' and 'mother's perceptions about the confinement practices' were statistically significantly different between the depressed and non-depressed mothers. It was found that, at bivariate level, 'get practical and emotional support during confinement' was of borderline significance. 'Happy with the pregnancy' and 'planned pregnancy' were not significant at the bivariate level.

Table 4.28: Results of Chi-square test for 3 months and 6 months variables

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
Average feeding time				**0.020**				**0.034**
Less than 15 minutes	126 (10.9)	11 (12.0)	137		86 (8.4)	7 (7.7)	93	
Between 15 and 30 minutes	434 (37.7)	34 (37.0)	468		288 (28.0)	18 (19.8)	306	
Between 30 minutes and 1 hour	172 (14.9)	13 (14.1)	185		171 (16.6)	9 (9.9)	180	
More than an hour	420 (36.5)	34 (37.0)	454		484 (47.0)	57 (62.6)	541	
Total	1152	92	1244		1029	91	1120	
Who decided to change the way you feed your baby				0.181				**0.005**
Myself	635 (82.6)	47 (75.8)	682		698 (86.2)	54 (74.0)	752	
Others	134 (17.4)	15 (24.2)	149		112 (13.8)	19 (26.0)	131	
Total	769	62	831		810	73	883	
Breastmilk enough for baby				**0.000**				**0.000**
No	379 (32.6)	43 (47.3)	422		398 (38.4)	53 (61.6)	451	
Yes	711 (61.1)	36 (39.6)	747		572 (55.2)	25 (29.1)	597	
Don’t know	74 (6.4)	12 (13.2)	86		66 (6.4)	8 (9.3)	74	
Total	1164	91	1255		1036	86	1122	

* At 6 months –the question was ‘at what age baby was given solids’

At 6 months

Table4.28: Results of Chi-square test for 3 months and 6 months variables (cont.)

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
How would you rate your confidence in breastfeeding				**0.007**				**0.011**
Totally not confident	4 (0.3)	2 (2.2)	6		5 (0.5)	2 (2.2)	7	
Not confident	13 (1.1)	4 (4.3)	17		11 (1.0)	4 (4.4)	15	
Neutral	138 (11.7)	11 (12.0)	149		97 (9.1)	11 (12.1)	108	
Confident	719 (60.7)	48 (52.2)	767		676 (63.4)	51 (56.0)	727	
Very confident	310 (26.2)	27 (29.3)	337		278 (26.1)	23 (25.3)	301	
Total	1184	92	1276		1067	91	1158	
How satisfied are you with your breastfeeding experience?				**0.037**				**0.022**
Totally not satisfied	2 (0.2)	0	2		2 (0.2)	1 (1.1)	3	
Not satisfied	21 (1.8)	6 (6.5)	27		17 (1.6)	5 (5.4)	22	
Neutral	143 (12.0)	12 (13.0)	155		86 (8.1)	11 (12.0)	97	
Satisfied	746 (62.8)	51 (55.4)	797		693 (64.9)	54 (58.7)	747	
Very satisfied	275 (23.2)	23 (25.0	298		269 (25.2)	21 (22.8)	290	
Total	1187	92	1279		1067	92	1159	

Table 4.28 lists some of the results of the bivariate analysis for the 3 months and 6 months variables. A more detail table is in Appendix F. The Chi-square tests shows that ‘average feeding time’, ‘if breastmilk is enough for baby’, ‘confidence in breastfeeding’ and ‘satisfaction with breastfeeding experience’ were statistically significantly different between depressed and non-depressed mothers. ‘Decision to change baby’s feeds’ was only significant at the 6 months visit.

4.3 MULTIVARIATE ANALYSIS

4.3.1 Factors associated with antenatal depression

Table 4.29: Results of Binary Logistic Regression Analysis for antenatal depression

Variable	Adjusted Odds Ratio	95% Confidence Interval	p- value
Age			
≤30	1		
>30	1.060	0.718-1.566	0.336
Ethnic			
Locals	1	0.582-1.272	0.451
Non-locals	0.860		
Religion			
Islam	1		0.333
Christian	1.240	0.900-1.709	
Buddhist	1.533		
Marital status*			
Single/not living with husband	1		0.788
Married	1.130	0.463-2.760	
Marriage duration			
< 5 years	1		0.169
> 5 years	0.771	0.533-1.117	
Mother's education level**			
Never/primary	1		
Secondary	1.395	0.968-2.012	0.154
Tertiary	1.090	0.581-2.043	
Mother's employment status	1		0.336
Not employed	1.202	0.826-1.750	
Employed			
Household income			
<RM1000	1		
RM1001-3000	0.649	0.434-0.971	**0.036**
>RM3000	0.457	0.213-0.982	
Satisfied with marriage			
No	1		0.422
Yes	0.718	0.319-1.613	
On family planning			
No	1		**0.001**
Yes	1.714	1.241-2.369	
Happy with the pregnancy			
No	1		**0.017**
Yes	0.403	0.191-0.850	
Is the pregnancy a planned one	1		**<0.001**
No	0.464	0.340-0.634	
Yes			

Table 4.29: Results of Binary Logistic Regression Analysis for antenatal depression (cont.)

Variable	Adjusted Odds Ratio	95% Confidence Interval	p- value
Any worries during pregnancy			**<0.001**
No	1	2.244-4.126	
Yes	3.043		
Baby's father preference			
No preference	1		
Prefers breastfeeding	1.133	0.821-1.564	0.448

*Unadjusted OR=2.101 (1.264-3.493); p=0.004

**Unadjusted OR=1.415 (1.065-1.882); p=0.041

Table 4.29 shows the risk factors associated with antenatal depression. The binary logistic regression analysis was conducted to look at these associations. Variables that had been selected to be included in the model were based on reports in the literature. Variables included in this model were 'mother's age', 'ethnic', 'religion', 'marital status', 'marriage duration', 'mother's education level', 'mother's employment status', 'monthly household income', 'satisfaction with marriage', 'mother practising family planning' (on contraception), 'mother happy with the pregnancy', 'the pregnancy is a planned one', 'being worried during pregnancy' and 'baby's father preference of infant feeding'.

Results show that risk factors for antenatal depression were low 'household income', 'mother practising family planning' (on contraception), 'not happy with the pregnancy', 'the pregnancy was not a planned one' and 'being worried during pregnancy'. Mothers with lower household income were more likely to be at risk of developing antenatal depression (p-value=0.036). Mothers who were on family planning have 1.714 times higher odds for developing antenatal depression (p-value=0.001). Mothers who were happy with the pregnancy (p-value=0.017) and have a planned pregnancy (p-value <0.001) statistically significantly have lower odds for having antenatal depression. On the other hand, mothers who were worried during pregnancy have 3.043 times higher odds in developing antenatal depression (p-value<0.001) than those who were not.

4.3.2 Factors associated with prelacteal feeds

Table 4.30: Results of Binary Logistic regression analysis for prelacteal feeds

Variable	**Adjusted OR (95%CI)**	**p-value**
Age		
<24	1	
24-34	1.151 (0.578-2.290)	**0.045**
≥35	2.654 (1.158-6.081)	
Religion		
Islam	1	
Christian	1.220 (0.648-2.295)	**0.016**
Buddhist	5.060 (1.675-15.282)	
Employment status		
Housewife	1	
Work full time	1.244 (0.559-2.765)	0.912
Work part time	1.492 (0.394-5.658)	
Self employed	0.992 (0.210-4.679)	
Marital status		
Married	1	
Single/divorced	0.533 (0.144-1.975)	0.346
Education level		
None/primary	1	
Secondary	0.518 (0.260-1.032)	**0.041**
Tertiary	1.258 (0.473-3.341)	
EPDS Group		
Depressed	1	
Not depressed	0.356 (0.108-1.173)	0.090
Ethnic		
Locals	1	0.844
Non-locals	1.071 (0.544-2.108)	

Results of Logistic regression analysis with p-value

Binary Logistic Regression analysis was conducted to test for factors that were associated with prelacteal feeds. Variables included in the model were based on those reported in the literature. These variables were ‘mother’s age’, ‘religion’, ‘mother’s employment status’, ‘marital status’, ‘education level’, ‘’EPDS group’ and ‘ethnic group’. The table above shows that ‘mother’s age’ (p=0.045), ‘religion’ (p=0.016) and ‘education level’ (p=0.041) were statistically significantly associated with prelacteal feeds. Mothers who were above 35 years old had higher odds (2.654) in giving prelacteal feeds than younger mothers. Compared to the Muslims, the Buddhists had higher odds (5.060) in giving prelacteal feeds. Highly educated mothers had higher odds (1.258) in giving prelacteal feeds than mothers with lower education.

4.3.3 Factors associated with postpartum depression

Table 4.31: Results of Binary Logistic Regression analysis for postpartum depression

Factor	Adjusted Odds Ratio	95% Confidence Interval	p-value
Generally consider yourself a worrier			
No	1.859	1.039-3.328	**0.037**
Yes			
Generally like yourself as a person			
No			
Yes	0.740	0.272-2.017	0.556
Get practical/emotional support during confinement			
No			
Yes	1.114	0.421-2.949	0.828
Husband helps take care of baby			
No			
Yes	0.208	0.070-0.621	**0.005**
Husband helps with housework			
No	0.300	0.068-1.333	
Yes			0.114
Satisfied with husband help during confinement			
No			
Yes	0.594	0.249-1.421	0.242
Relationship with husband			
Not good			
good	0.079	0.007-0.862	**0.037**
Happy with the relationship			
No			
Yes	0.103	0.019-0.551	**0.008**
Problem with childcare during confinement			
No	0.647	0.351 -1.192	0.163
Yes			
Constantly worried about the baby			
No			
Yes	1.336	0.799-2.235	0.269
Experienced ‘Maternity blues’			
No			
Yes	3.227	1.823-5.712	**<0.001**
Have problems which haunts most of the time			
No			
Yes	1.535	0.851-2.771	0.155
Have emotional problem during the last pregnancy			
No			
Yes	1.978	1.089-3.590	**0.025**

Table 4.31: Results of Binary Logistic Regression analysis for postpartum depression (cont.)

Factor	**Adjusted Odds Ratio**	**95% Confidence Interval**	**p-value**
Worry during previous pregnancy			
No			
Yes	1.590	0.884-2.862	0.122
Major life events during pregnancy			
No			
Yes	1.329	0.609-2.902	0.475
Food taboos during confinement			
No			
Yes	1.976	1.164-3.355	**0.012**
Confined in the house only			
No			
Yes	1.206	0.729-1.992	0.466
Previous depression			
No			
Yes	1.982	1.174-3.344	**0.010**
Feel about the confinement practices			
Neutral	0.776	0.437-1.377	0.680
Good	0.901	0.340-2.390	
Bad			

The Binary Logistic Regression analysis was used for the multivariate level analysis. Variables entered into this model were ‘generally consider yourself a worrier’, ‘generally like yourself as a person’, ‘get practical/emotional support during confinement’, ‘husband helps take care of baby’, ‘husband helps with housework’, ‘satisfied with husband help during confinement’, ‘relationship with husband’, ‘happy with the relationship’, problem with childcare during confinement’, ‘constantly worried about the baby’, ‘experienced ‘Maternity blues’, ‘have problems which haunts most of the time’, ‘have emotional problem during the last pregnancy’, ‘worry during previous pregnancy’, ‘major life events during pregnancy’, ‘food taboos during confinement’, ‘confined in the house only’, ‘previous depression’ and ‘feel about the confinement practices’.

At the multivariate level, 8 factors are statistically significantly different between mothers with depressive symptoms and mothers without depressive symptoms. These factors are ‘consider oneself a worrier’, ‘husband helps take care of baby’, ‘relationship with husband’, ‘satisfaction with relationship with husband’, ‘maternity blues’, ‘have emotional problem during last pregnancy’, ‘food taboos during confinement’ and ‘previous depression’.

4.3.4 Effects of breastfeeding duration on postpartum depression

Table 4.32: Generalised Estimated Equation Model for 'Full Breastfeeding' duration and postpartum depression'

Variable	AOR	95% CI	p-value
Mother's age	0.975	0.940-1.011	0.178
Mother's education level			
Never/primary	0.691	0.294-1.624	
Secondary	0.625	0.282-1.383	0.477
Tertiary	1		
Mother's employment status			
Not employed	0.883	0.511-1.528	0.657
Employed	1		
Marital status			
Single/not living with Husband	0.944	0.231-3.854	0.936
Married	1		
Household income			
<RM 1000	3.235	1.054-9.928	**0.040**
RM 1001-3000	2.433	0.872-6.792	
>RM 3001	1		
Get support during confinement			
No	1.537	0.847-2.791	
Yes	1		0.158
Husband help in taking care of baby			
No	2.800	1.150-6.819	**0.023**
Yes	1		
Relationship with husband			
Good	2.580	0.177-37.585	0.488
Not good	1		
Problem with childcare			
No	0.647	0.406-1.030	0.066
Yes	1		
Having problems most of the time			
No	0.329	0.204-0.530	**<0.001**
Yes	1		
Planned pregnancy			
No	0.884	0.599 - 1.304	0.534
Yes	1		
Like yourself as a person			
No	1.351	0.664-2.751	0.407
Yes	1		
Intention to breastfeed			
No	1.041	0.558-1.941	0.900
Yes	1		
Attended breastfeeding classes			
No	1.435	0.960-2.143	0.078
Yes	1		
Duration of 'full breastfeeding'	0.979	0.954-1.005	0.111
EPDS antenatal			
<12 (not depressed)	0.306	0.195-0.480	**<0.001**
>12 (depressed	1		

The Generalised Logistic Estimated Equation (GEE) Model was performed to test for factors that may have an effect on the 'full breastfeeding duration'. Variables that were to be included in the model were based on reports in the literature. In this model, the variables included were mother's age, education level, employment status, marital status, monthly household income, received practical and emotional support during confinement, received husband's help in taking care of baby, relationship with husband, problems with childcare during confinement, having problems most of the time, if the pregnancy is planned, mothers self-esteem, breastfeeding intention, attended breastfeeding classes during antenatal, duration of full breastfeeding and if mothers were depressed at antenatal.

The GEE model shows that 'full breastfeeding' duration has no significant association with postpartum depression. However, other factors, namely, 'household income', 'husband helps in taking care of baby' (i.e. husbands support) and 'having problems most of the time' were significantly associated with postpartum depression while controlling for antenatal depression. 'Lower household income' has 3.25 higher odds of having postpartum depression (p-value=0.04). Similarly, 'mothers who did not get husband's help in taking care of the baby' were 2.8 times more likely to be depressed (p-value=0.023). 'Mothers who have problems that haunts them most of the time' were statistically significantly less likely to have longer breastfeeding duration (p-value=<0.001).

Table 4.33: Generalised Estimated Equation Model for 'Any Breastfeeding' duration and postpartum depression'

Variable	**AOR**	**95% CI**	**p-value**
Mother's age	0.966	0.932-1.001	0.059
Mother's education			
Never/primary	0.740	0.327-1.674	0.283
Secondary	0.598	0.281-1.275	
Tertiary	1		
Mother's employment status			
Not employed	0.865	0.500-1.498	0.605
Employed	1		
Marital status			
Single/not living with Husband	0.755	0.189-3.019	0.691
Married	1		
Household income			
<RM 1000	3.091	0.999-9.568	0.139
RM 1001-3000	2.655	0.956-7.377	
>RM 3001	1		
Get support during confinement			
No	1.418	0.772-2.604	0.260
Yes	1		
Husband help in taking care of baby	3.059	1.258-7.436	**0.014**
No	1		
Yes			
Relationship with husband			
Good	2.246	0.161-31.314	0.547
Not good	1		
Problem with childcare			
No	0.604	0.384-0.949	**0.029**
Yes	1		
Having problems most of the time			
No	0.325	0.202-0.522	**<0.001**
Yes	1		
Planned pregnancy			
No	0.876	0.597-1.285	0.498
Yes	1		
Like yourself as a person			
No	1.375	0.675-2.802	0.380
Yes	1		
Intention to breastfeed			
No	0.913	0.466-1.788	0.790
Yes	1		
Attended breastfeeding classes			
No	1.389	0.931-2.071	0.107
Yes	1		
Duration of 'any breastfeeding'	0.983	0.956-1.012	0.251
EPDS antenatal			
<12 (not depressed)	0.274	0.178-0.423	**<0.001**
>12 (depressed)	1		

For ‘Any breastfeeding’ duration, the Generalised Estimated Equation (GEE) modelling was used to test for the effect of ‘any breastfeeding’ duration on postpartum depression. Variables included in this model were selected from the literature. Variables included were the same as the GEE model for ‘full breastfeeding’ duration which were mother’s age, education level, employment status, marital status, monthly household income, received practical and emotional support during confinement, received husband’s help in taking care of baby, relationship with husband, problems with childcare during confinement, having problems most of the time, if the pregnancy is planned, mothers self-esteem, breastfeeding intention, attended breastfeeding classes during antenatal, duration of full breastfeeding and if mothers were depressed at antenatal

Table 4.33 shows that ‘any breastfeeding’ duration had no significant association with the development of postpartum depression after controlling for antenatal depression. One of the factors which were statistically significant in the development of postpartum depression in this study appeared to be ‘not getting help from husband in taking care of the baby’. Mothers who did not receive any help from their husbands have the odds of 3.059 of becoming depressed during the postpartum period ($p=0.014$). Other significant factors included ‘having problem with childcare during confinement’ and ’having problem which haunts most of the time’. Mothers who have problem with childcare during confinement ($p=0.029$) and mothers who have problems which haunts most of the time ($p<0.001$) were more likely to develop postpartum depression. The latter shows the strongest association with postpartum depression.

4.3.5 Effects Antenatal depression on breastfeeding duration

Table 4.34: Results of Cox Proportional Hazards Regression analysis for antenatal depression and 'full breastfeeding' duration

Variable	**Adjusted Hazard Ratio**	**95% CI**	**p-value**
Mother's age	1.007	0.991 – 1.023	0.385
Mother's education			
Primary	1.0		0.416
Secondary	0.850	0.600 – 1.205	
Tertiary	0.970	0.718 – 1.310	
Mother's employment status			
Unemployed	1.0		**0.008**
Employed	0.760	0.621 – 0.931	
Marital status			
Single/not living with husband	1		0.059
Married	0.564	0.311 – 1.022	
Household income			
<RM 1000	1		0.720
RM 1000-3000	0.935	0.610 – 1.434	
> 3000	1.017	0.676 - 1.529	
Get practical and emotional support during confinement			
No	1		0.539
Yes	0.905	0.658 – 1.245	
Husband help in taking care of baby			
No	1		**0.008**
Yes	1.867	1.176 – 2.966	
Father's preference			
Prefers breastfeeding	1	1	0.263
Prefers formula-feeding	0.904	0.756 – 1.079	
Method of delivery			
Vaginal delivery	1		**0.031**
Caesarean section	0.748	0.575 – 0.974	
Intention to breastfeed			
No	1		**0.010**
Yes	1.556	1.114 – 2.174	
Attended breastfeeding classes			
No	1		**0.011**
Yes	0.806	0.682 – 0.952	
Ethnic group			
Locals	1		0.662
Non-locals	1.045	0.859 – 1.269	
EPDS antenatal			
<12 (not depressed)	1		
>12 (depressed)	1.119	0.883 – 1.419	0.351
Is baby very demanding			
No	1		0.979
Yes	1.002	0.838 – 1.199	

The Cox Proportional Hazards Regression analysis was conducted to test for the effect of antenatal depression on 'full breastfeeding' duration. Variables selected to be included in this model were based on reports in the literature. Variables included were 'mother's age', 'education level', 'employment status', 'marital status', 'monthly household income', 'received practical and emotional support during confinement', 'received husband's help in taking care of baby', 'baby's father preference in type of infant feeding', 'method of delivery', 'breastfeeding intention', 'antenatal breastfeeding classes', 'ethnic group', 'mother's EPDS at antenatal' and 'baby very demanding'.

Table 4.34 above shows that antenatal depression had no significant association with 'full breastfeeding' duration. However, 'mothers employment status', 'husband help in taking care of the baby', 'method of delivery', 'intention to breastfeed' and 'antenatal breastfeeding classes' were significantly associated with 'full breastfeeding' duration. Unemployed mothers have higher odds for longer 'full breastfeeding' duration (p=0.008) than employed mothers. Women whose husbands helped take care of baby have 1.867 times higher odds for longer 'full breastfeeding' duration (p=0.008). Those who had vaginal delivery were more likely to have longer 'full breastfeeding' duration (p=0.031). Mothers who intended to breastfeed had 1.556 times higher odds (p=0.010) for longer 'full breastfeeding' duration. Interestingly, in this study, mothers who did not attend breastfeeding classes had higher odds for longer 'full breastfeeding' duration than their counterparts.

Table 4.35: Results of Cox Proportional Hazards Regression analysis for antenatal depression and 'any breastfeeding' duration

Variable	**Adjusted Hazard Ratio**	**95% CI**	**p-value**
Mother's age	0.989	0.962-1.017	0.438
Mother's education Primary Secondary Tertiary	 1 0.632 0.857	 0.353 – 1.132 0.532 – 1.381	 0.199
Mother's employment status Unemployed Employed	 1 0.708	 0.500 – 1.002	 0.051
Marital status Single/not living with husband Married	 1 1.033	 0.436 – 2.446	 0.941
Household income <RM 1000 RM 1000-3000 > 3000	 1 1.130 1.170	 0.559 – 2.287 0.605 – 2.264	 0.889
Get practical and emotional support during confinement No Yes	 1 1.118	 0.644 – 1.940	 0.691
Husband help in taking care of baby No Yes	 1 1.572	 0.705-3.506	 0.269
Father's preference Prefers breastfeeding Prefers formula-feeding	 1 0.871	 0.637 -1.190	 0.386
Method of delivery Vaginal delivery Caesarean section	 1 0.808	 0.516 -1.265	 0.352
Intention to breastfeed No Yes	 1 1.859	 1.151 – 3.001	 **0.011**
Attended breastfeeding classes No Yes	 1 1.079	 0.811 – 1.436	 0.600
Ethnic group Locals Non-locals	 1 0.949	 0.680 – 1.323	 0.757
EPDS antenatal <12 (not depressed) >12 (depressed	 1 1.212	 0.797 -1.843	 0.369
Is baby very demanding No Yes	 1 0.838	 0.619 – 1.134	 0.251

Similar tests were conducted to test for the effect of antenatal depression on ‘any breastfeeding’ duration. Variables included were ‘mother’s age’, ‘education level’, ‘employment status’, ‘marital status’, ‘monthly household income’, ‘practical and emotional support during confinement’, ‘husband’s help in taking care of baby’, ‘baby’s father preference in type of infant feeding’, ‘method of delivery’, ‘breastfeeding intention’, ‘antenatal breastfeeding classes’, ‘ethnic group’, ‘antenatal EPDS’ and ‘baby very demanding’.

Table 4.35 shows that ‘intention to breastfeed’ was the only significant factor which was associated with ‘any breastfeeding’. Mothers who intended to breastfeed had 1.859 higher odds for longer ‘any breastfeeding’ duration (p=0.011). Antenatal depression was not statistically significantly associated with ‘any breastfeeding’ duration.

4.3.6 Effects of postpartum depression on breastfeeding duration

Table 4.36: Results of Cox Proportional Hazards Regression analysis for postpartum depression and 'full breastfeeding' duration

Variable	**Adjusted Hazard Ratio**	**95% CI**	**p-value**
Mother's age	1.008	0.992 – 1.025	0.339
Mother's education			
Primary	1		
Secondary	0.816	0.564 – 1.180	0.380
Tertiary	0.934	0.678 – 1.287	
Mother's employment status			
Not employed	1		**0.009**
Employed	0.748	0.602 – 0.930	
Marital status			
Single/not living with husband	1		0.472
Married	0.807	0.449 – 1.448	
Household income			
<RM 1000	1		
RM 1000-3000	1.134	0.714 – 1.800	0.795
> 3000	1.162	0.746 - 1.811	
Get practical and emotional support during confinement			
No	1		0.587
Yes	0.914	0.662 – 1.263	
Husband help in taking care of baby			
No	1		**0.013**
Yes	1.972	1.157 – 3.361	
Relationship with husband			
Good	1		0.809
Not good	1.167	0.449 – 1.448	
Unplanned pregnancy			
No	1		0.064
Yes	1.199	0.990 -1.452	
Generally like yourself as a person			
No	1		0.098
Yes	0.717	0.484-1.063	
Have problem most of the time			
No	1		0.468
Yes	0.910	0.704 – 1.175	
Is baby very demanding			
No	1		0.728
Yes	1.036	0.851-1.260	
Problem with childcare during confinement	1		0.710
No	0.955	0.751 – 1.216	
Yes			
Intention to breastfeed			
No	1		
Yes	1.669	1.187 – 2.345	**0.003**

Table 4.36: Results of Cox Proportional Hazard Regression analysis for postpartum depression and 'full breastfeeding' duration (cont.)

Variable	**Adjusted Hazard Ratio**	**95% CI**	**p-value**
Attended breastfeeding classes			
No	1		**0.017**
Yes	0.806	0.675 – 0.962	
EPDS antenatal			
<12 (not depressed)	1		0.166
>12 (depressed)	1.199	0.928 – 1.549	
EPDS 1 month			
<12 (not depressed)	1		0.414
>12 (depressed)	0.864	0.609 – 1.226	
EPDS 3 months			
<12 (not depressed)	1		0.239
>12 (depressed)	0.802	0.555 – 1.158	
EPDS 6 months			
<12 (not depressed)	1		0.946
>12 (depressed)	1.012	0.719 – 1.425	

The Cox Proportional Hazard Regression analysis was conducted to test for the effect of postpartum depression on 'full breastfeeding' duration. Variables included were 'mother's age', 'education level', 'employment status', 'marital status', 'monthly household income', 'practical and emotional support during confinement', 'husband helps in taking care of baby', 'relationship with husband', 'planned pregnancy', 'mother's self-esteem', 'have problems which haunts most of the time', 'baby very demanding', 'problem with childcare', 'breastfeeding intention', 'antenatal breastfeeding classes', 'antenatal EPDS' and 'postpartum EPDS'.

From the model, postpartum depression has no effect on 'full breastfeeding' duration. Factors which were statistically significantly associated with 'full breastfeeding' duration were mothers' employment status', 'husband help in taking care of the baby', 'intention to breastfeed' and 'antenatal breastfeeding classes'. Unemployed mothers were more likely to have longer 'full breastfeeding' duration than employed mothers. Mothers whose husbands help in taking care of the baby had higher odds (AOR=1.972; p=0.013) for longer 'full breastfeeding' duration. Mothers who at antenatal intended to breastfeed had 1.669 times higher odds for longer 'full breastfeeding' duration (p=0.003). However, it was interesting to find that mothers who attended breastfeeding classes had lower odds for longer 'full breastfeeding' duration than those who did not.

Table 4.37: Results of Cox Proportional Hazard Regression analysis for postpartum depression and 'any breastfeeding' duration

Variable	**Adjusted Hazard Ratio**	**95% CI**	**p-value**
Mother's age	0.981	0.952-1.010	0.193
Mother's education			
Primary	1		
Secondary	0.655	0.348-1.234	0.145
Tertiary	0.945	0.553-1.616	
Mother's employment status			
Not employed	1		0.108
Employed	0.740	0.513-1.068	
Marital status			
Single/not living with husband	1		
Married	1.417	0.611-3.286	0.417
Household income			
<RM 1000	1		
RM 1000-3000	1.314	0.575-3.000	0.765
> 3000	1.344	0.608-2.970	
Get practical and emotional support during confinement			
No	1		0.789
Yes	1.075	0.615-1.880	
Husband help in taking care of baby			
No	1		0.988
Yes	0.991	0.311-3.156	
Relationship with husband			
Good	1		
Not good	0.784	0.083-7.391	0.832
Unplanned pregnancy			
No	1		0.470
Yes	0.889	0.646-1.224	
Generally like yourself as a person			
No	1		0.481
Yes	0.773	0.377-1.582	
Have problem that haunts most of the time			
No	1		0.785
Yes	1.065	0.677-1.676	
Is baby very demanding			
No	1		0.474
Yes	0.887	0.638-1.232	
Problem with childcare during confinement	1		0.147
No	0.750	0.508-1.107	
Yes			

Table 4.37: Results of Cox Proportional Hazard Regression analysis for postpartum depression and 'any breastfeeding' duration (cont.)

Variable	**Adjusted Hazard Ratio**	**95% CI**	**p-value**
Intention to breastfeed			
No	1		**0.006**
Yes	1.985	1.220-3.231	
Attended breastfeeding classes			
No	1		0.773
Yes	1.046	0.772-1.416	
EPDS antenatal			
<12 (not depressed)	1		0.246
>12 (depressed)	1.317	0.827-2.096	
EPDS 1 month			
<12 (not depressed)	1		0.560
>12 (depressed)	0.837	0.459-1.525	
EPDS 3 months			
<12 (not depressed)	1		0.262
>12 (depressed)	0.713	0.394-1.288	
EPDS 6 months			
<12 (not depressed)	1		0.890
>12 (depressed)	1.042	0.581-1.870	

Similarly, the Cox Proportional Hazard Regression analysis was conducted to test for the effect of postpartum depression on 'any breastfeeding' duration. Variables included were 'mother's age', 'education level', 'employment status', 'marital status', 'monthly household income', 'practical and emotional support during confinement', 'husband helps in taking care of baby', 'relationship with husband', 'planned pregnancy', 'mother's self-esteem', 'problems which haunts most of the time', 'baby very demanding', 'problem with childcare', 'breastfeeding intention', 'antenatal breastfeeding classes', 'antenatal EPDS' and 'postpartum EPDS'.

Table 4.37 above shows that while controlling for antenatal depression, postpartum depression at all the three measurements had no significant association with the duration of 'any breastfeeding'. The only variable that had a significant association was 'intention to breastfeed'. Mothers who planned to breastfeed had the odds of 1.985 for longer 'any breastfeeding' duration (p=0.006).

4.4 Survival Analysis

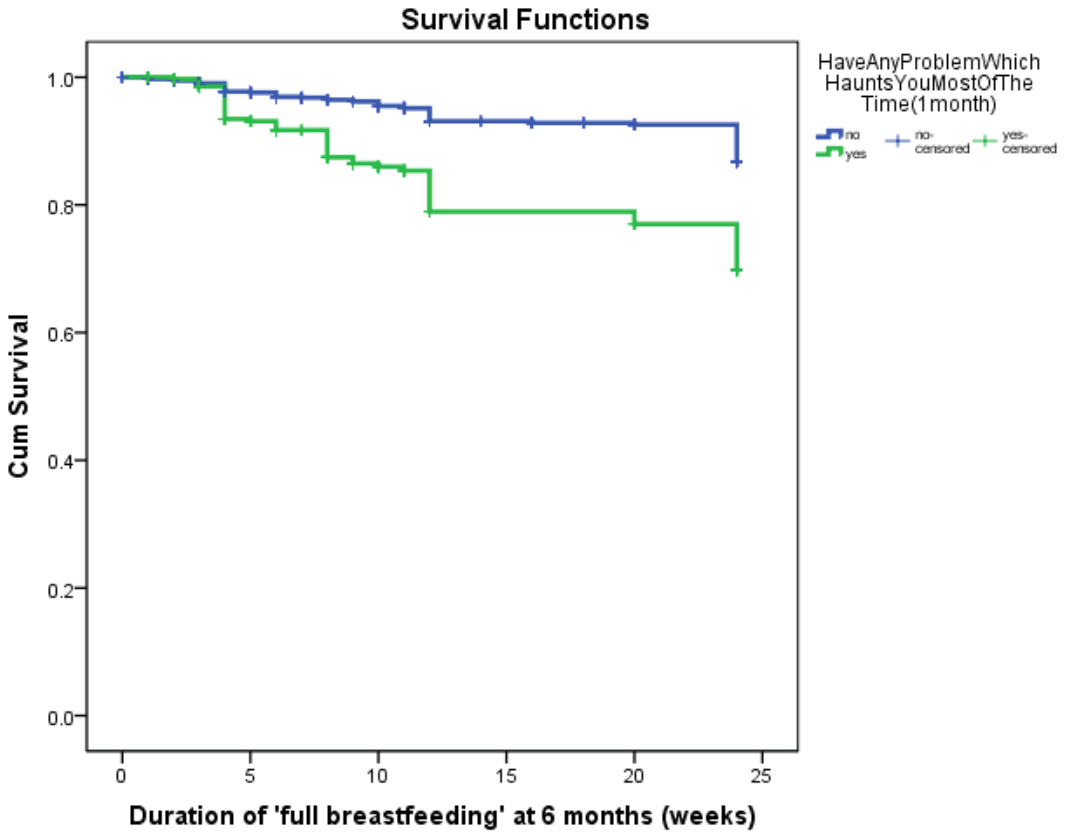

Figure 4.7: Plot of the Survival Functions of 'full breastfeeding' at 6 months between mothers who have problems most of the time and those who do not.

Note: The starting percentage for the survival curve is 100%. The Y-axis starts at 95% (breastfeeding initiation rate).

The graph above shows that there was a statistically significant difference (Log Rank Chi-Square 53.905, $p<0.001$) in the duration of 'full breastfeeding' between mothers who have problems which haunts most of the time and those who did not. The graph shows that the survival for 'full breastfeeding' duration was similar between mothers who had problems and those who did not at the beginning. However, as the 'full breastfeeding' duration prolonged, at about 4 weeks, the survival curve shows that mothers who do not have problems have higher survival for 'full breastfeeding' duration.

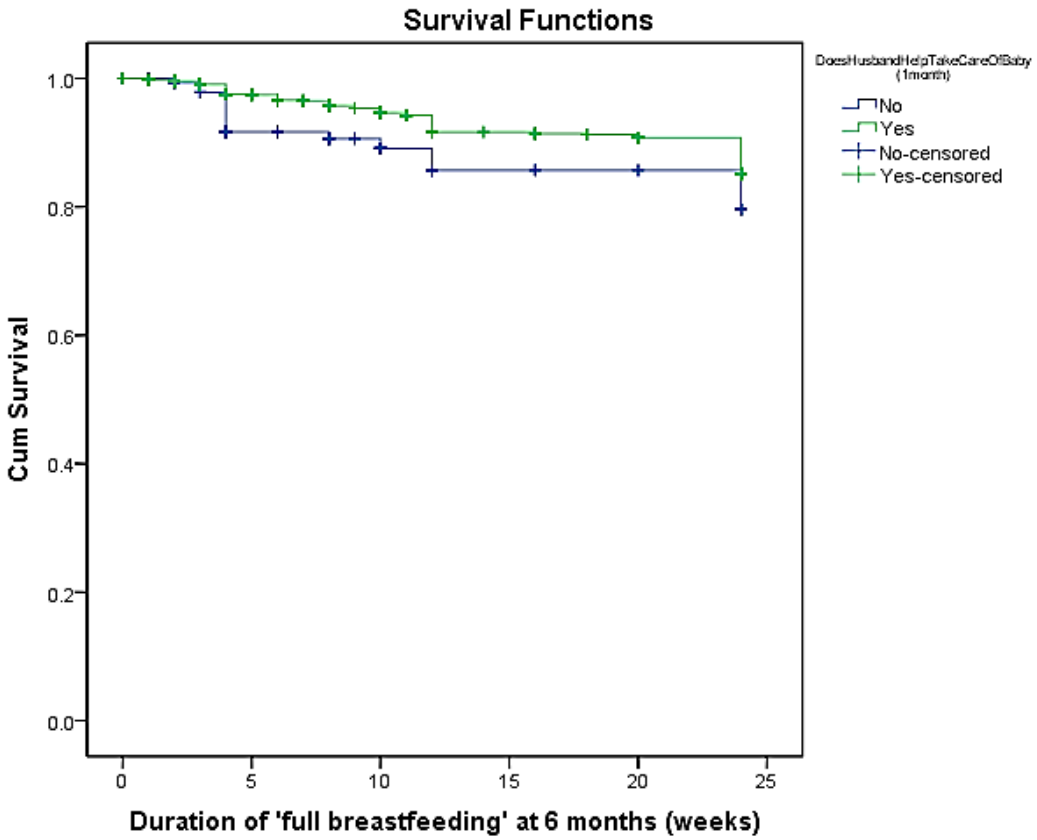

Figure 4.8: Plot of the Survival Functions of ‘full breastfeeding’ duration at 6 months between mothers whose husband help take care of baby and those who do not.

Note: The starting percentage for the survival curve is 100%. The Y-axis starts at 95% (breastfeeding initiation rate).

The graph above shows that there was a statistically significant difference (Log Rank Chi-Square 10.355, $p<0.001$) in the duration of breastfeeding only between mothers whose husbands help in taking care of baby and those who did not. Mothers whose husband help in taking care of the baby has higher survival for ‘full breastfeeding’ duration than their counterparts.

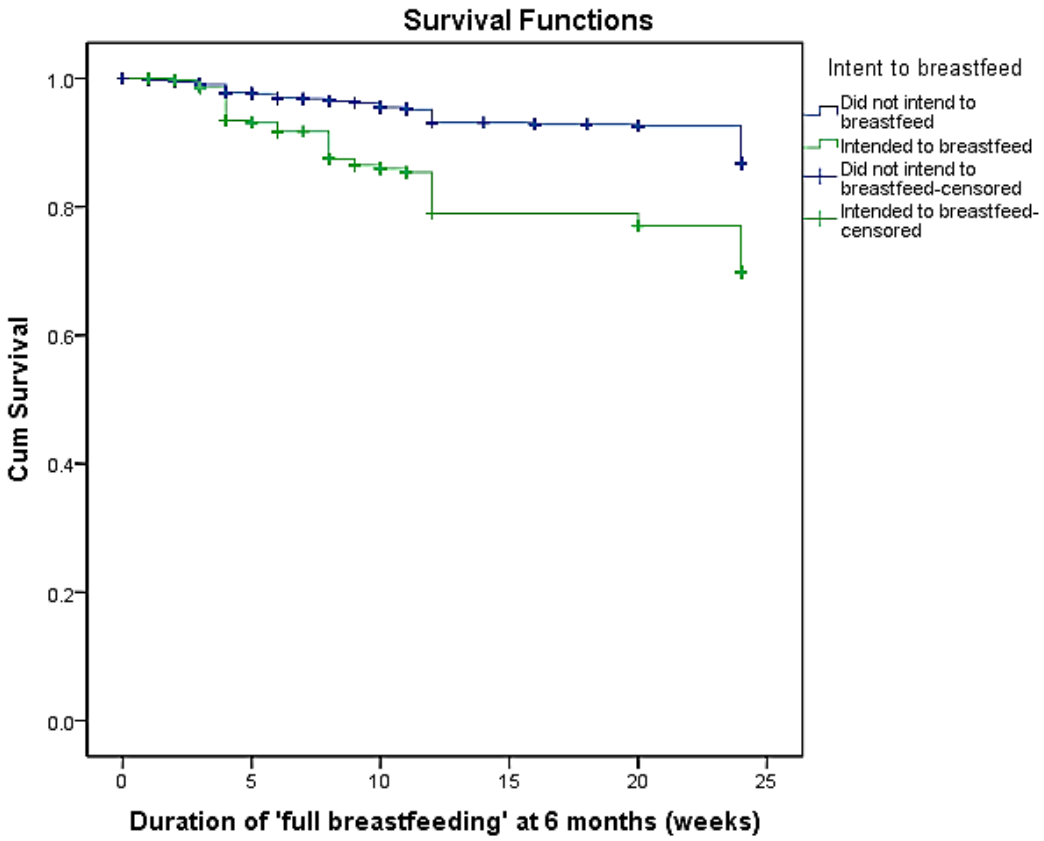

Figure 4.9: Plot of the Survival Functions of Duration of 'full breastfeeding' at 6 months and 'intention to breastfeed'

Note: The starting percentage for the survival curve is 100%. The Y-axis starts at 95% (breastfeeding initiation rate).

The graph above shows that there was a statistically significant difference (Log Rank Chi-Square 6.696, $p<0.001$) in the duration of breastfeeding only between mothers who intended to breastfeed and those who did not. Before 4 weeks, the survival curve shows that there was no difference between mothers who intended to breastfeed and who did not intend to breastfeed. However, at about 4 weeks there was a difference in the survival of 'full breastfeeding' duration between mothers who intended to breastfeed and those who did not. This difference was greater from about 12 weeks of the duration of 'full breastfeeding'.

CHAPTER FIVE: DISCUSSION

Overview

This is the first study to examine specifically factors related to breastfeeding and postpartum depression in Sabah, Malaysia. Other studies on postpartum depression in Malaysia were of smaller scale and were conducted in Peninsular Malaysia and none of these studies had specifically looked into the association of breastfeeding and postpartum depression in Sabah.

This chapter will include the discussion of the results of this study which were presented in chapter 4. In this chapter, the results of this study will be discussed in depth pertaining to the objectives as follows:

1. To document the rates of breastfeeding initiation and breastfeeding duration in Sabah.
2. To describe the factors associated with breastfeeding practices
3. To identify the factors associated with antenatal and postpartum depression
4. To describe the effects of breastfeeding duration on postpartum depression
5. To describe the effects of antenatal depression on breastfeeding duration.
6. To describe the effects of postpartum depression on breastfeeding duration
7. To describe other factors associated with breastfeeding.
8. To identify the association of cultural/traditional beliefs practices and postpartum depression.

5.1 Rates of breastfeeding initiation and breastfeeding duration in Sabah

5.1.1 Breastfeeding Initiation

The rate of breastfeeding initiation in this study was high, 95.6%, confirming the findings of the Malaysian national data. The National Health and Morbidity Survey (NHMS) II and III conducted in 1996 and 2006 respectively found that percentage of 'ever breastfed' were 88.6% and 94.7% (Fatimah et al., 2010). In Fatimah's study (population based cross-sectional study using a two-stage stratified sampling design proportionate to population size throughout all states in Malaysia, n=2167), 'ever breastfeeding' rate was defined as the percentage of children less than 12 months who were breastfed. In Malaysia, the rates of 'ever breastfed' had been 92% in

1950s, 78% in 1970s, 88.6% in 1996 and 94.7% in 2006 (Ministry of Health Malaysia, 1996, Fatimah et al., 2010). The current study shows that there has been an increase in breastfeeding initiation in Malaysia with the breastfeeding initiation rate at 95.6%.

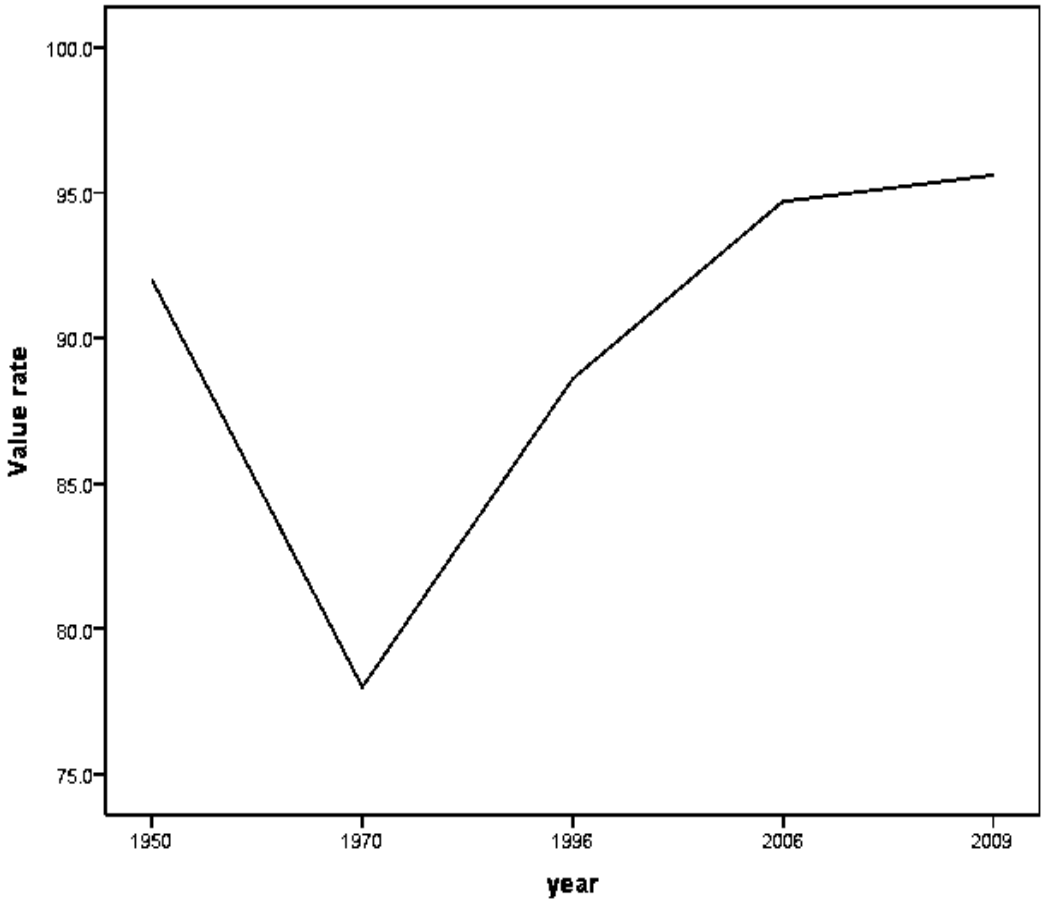

Figure 5.1: Trends in breastfeeding initiation (ever breastfed) in Malaysia

Figure 5.1 above shows that in Malaysia, breastfeeding initiation rate or percentage of 'ever breastfed' babies shows a decreasing trend from 92% in the 1950's to 78% in the 1970's but the rates increased from 1970's onwards to 2009.

In the Perth Infant Feeding Study 1 (PIFS1) and 2 (PIFS2) in 1992-1993 and 2002-2003 respectively, the initiation of breastfeeding was 88.1% and 93.8% (Scott et al., 1996, Scott et al., 2006b). The PIFS1 and 2 were conducted in the same two public regional hospitals in Perth among 556 and 587 women respectively.

In China, breastfeeding initiation was 91% in Hangzhou (2005, n=638) (Qiu et al., 2007), 92.2% in Xinjiang (2003-2004, n=1219) (Xu et al., 2007) and 96.7% in Zhejiang (2004-2005, n=1520) (Qiu et al., 2009). Similar to this current study, a study in 1996-1997 in Perth, Australia (n=1745) showed that breastfeeding was initiated by 95.7% of the mothers (Henderson et al., 2003).

In other studies, the breastfeeding initiation rate in hospital was 91% in 1991 in Sydney (n=-365) (Cooke et al., 2007), 94.5% in Singapore (2001, n=2098) (Foo et al., 2005), 86% in the United States (1999-2002, n=1436) (Fairlie et al., 2009) and 83.7% in Taiwan (2005, n=21 248) (Chuang et al., 2010). It is important to note that the study in Sydney collected the information of breastfeeding initiation at 2 weeks postpartum, at 2 months for the Singaporean study while the studies in the United States and Taiwan were at 6 months postpartum. This information should be interpreted with caution because the length of recall time influences accuracy whereby data become less accurate with the length of recall (Binns et al., In press).

A high breastfeeding initiation rate brings optimum benefit to infants and mothers if it is followed by an exclusive breastfeeding for around six months and any breastfeeding duration to 12 months or longer. One cross-sectional study of 342 mothers in the east-coast of Peninsular Malaysia in 2008 showed that 99.4% babies were ‘ever breastfed’ but the median duration of exclusive breastfeeding was only 2 months and only 29.8% mothers were exclusively breastfeeding at age of less than a month (Karim and Muda, 2009).

The high breastfeeding initiation rate (95.6%) in this study was followed by increased breastfeeding duration (‘any breastfeeding’ rate at 6 months was 80.7%). High breastfeeding duration in this study could be due to the lower rates of use of prelacteal feeds and the influence of culture. In Malaysia, breastfeeding is a common practise among women of low socio-economic status while in developed countries breastfeeding is a culture among women of high socio-economic status.

In Malaysia, the state of Selangor, which has the highest per capita income, was reported to have the lowest breastfeeding rate (Ministry of Health Malaysia, 1996). The high breastfeeding initiation in this current study could also be due to the fact that 68.3% of the mothers are from the lowest income group. Tan (2009a) commented that not exclusively breastfeeding at four weeks was associated with higher household income and that the reverse is true in developed countries.

Women from higher income were more likely to believe that breastfeeding was better for their infants than women from less advantaged backgrounds This was found in a study of 93 women in Barbados (Galler et al., 2006). Overall, the ever breastfed rate found in this current study is as high as any reported studies.

5.1.2 Breastfeeding duration

In this study, exclusive breastfeeding was not measured because of the cultural practice of the locals where giving other fluids especially plain water to babies is the norm, which local tradition claims is due to the warm tropical climate. For this reason it was difficult to use the term ‘exclusive breastfeeding’ following the strict WHO definition of ‘exclusive breastfeeding’. The term ‘full breastfeeding’, also referred to ‘predominant breastfeeding’ in the WHO classification (WHO, 1991), was more appropriate to be used in the context of this study in order not to provide misleading information.

Another justification for using the term ‘full breastfeeding’ instead of ‘exclusive breastfeeding’ was based on the explanations for figure 5.2 as below.

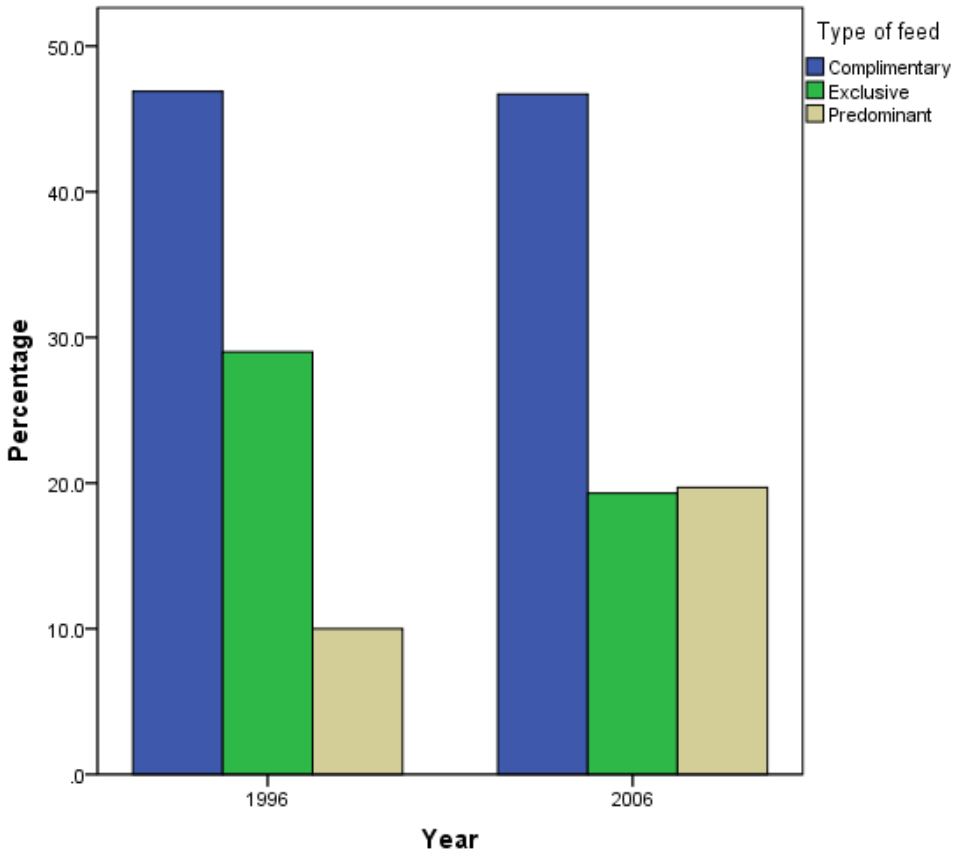

Figure 5.2: Prevalence of exclusive, predominant and complementary breastfeeding of infants below the age of 4 months from the Malaysian National Health and Morbidity Statistics data in 1996 and 2006

The graph above shows that the prevalence of exclusive breastfeeding decreased by 9.7% whereas the prevalence of predominant breastfeeding increased by the same percentage in the decade to 2006. Nevertheless, complementary breastfeeding varied little during the 10 years period (46.9% in 1996 and 46.7% in 2006). One explanation for this was that the WHO definition for exclusive breastfeeding had been strictly applied in the 2006 study, but not in the previous study. Therefore, for the current study, it is important to use the correct term according to WHO definitions (WHO, 1991).

Despite the programs by the government to promote breastfeeding, the prevalence of exclusive breastfeeding had shown a decrease in the 10 years period. During this period the prevalence of 'ever breastfed' (88.6% to 94.7%), 'timely initiation of breastfeeding' (41.4% to 63.7%) and 'continued breastfeeding up to 2 years' (11.7% to 34.4%), increased suggesting that promotion program may have had some

benefit. Breastfeeding promotion programs in Malaysia have been described in Chapter Two.

The decreasing trend in the prevalence of exclusive breastfeeding is not consistent with the WHO recommendation. However, the increased prevalence of continued breastfeeding up to 2 years from 11.7% in 1996 to 34.4% in 2006 is consistent with WHO recommendations.

In this study, the rates of 'full breastfeeding' at 1 month, 3 months and 6 months were 67.2%, 49.8% and 36.1%, respectively. In the NHMSIII, the prevalence of predominant breastfeeding (infant receives breastmilk and water or water based drinks) among infants below four months of age was 19.7% and 16.9% among infants below 6 months of age (Fatimah et al., 2010).

The 'any breastfeeding' rates in this study decreased from 95.9% at 1 month to 88.2% at 3 months and 80.7% at 6 months due to the increase in formula-feeding rates from 1 month to 6 months. In the NHMSIII, the overall prevalence of complementary breastfeeding (infant receives breast milk and any other fluid or food including non-human breast milk) was 46.7% for infants below 4 months of age and 46.9% for infants below 6 months of age. The disparity between the results of the current study and NHMSIII is because the NHMSIII categorized complementary breastfeeding separately from exclusive and predominant breastfeeding. These rates are high by most international surveys.

The disparity between the results of this study on 'full breastfeeding' and 'any breastfeeding' rates and of the NHMSIII is due to the fact that NHMSIII separately classified predominant and complementary breastfeeding whereas in the current study, the classifications were based on WHO definitions. Also this study is a cohort study whereas the NHMSIII is a cross sectional study.

A cross-sectional study of 682 mother-infant pairs in the district of Klang, Malaysia in 2006 reported the prevalence of exclusive breastfeeding of 63.3% and 32.4% at 1 month and 6 months respectively (Amin et al., 2011) which were similar to the findings of this study ('full breastfeeding rate was 67.2% at 1 month and 36.1% at 6 months).

In the PIFS1 (Australia), at 3 and 6 months, 61.8% and 49.9% were still breastfeeding either fully or partially (Scott et al., 1999). The Singapore National Breastfeeding Survey in 2001 (n=2098) showed that 71.6% mothers were still breastfeeding at 1 month but the rates dropped to 49.6% at 2 months, 29.8% at 4 months and 21.1% at 6 months (Foo et al., 2005). In Japan, the rate of breastfeeding at 1 month was only 42.4% (The Ministry of Health, 2006).

5.2 Factors associated with breastfeeding practices

5.2.1 Prelacteal Feeds

Prelacteal feed can interfere with breastfeeding initiation and duration. El-Gilany et al. (2011) reported that 'not giving prelacteal feed' was an independent predictor for exclusive breastfeeding at 6 months while providing milk-based prelacteal feeds was negatively associated with both exclusive and any breastfeeding among 0-6 months old infants (PerezEscamilla et al., 1996). However, by definition, an infant is no longer exclusively breastfed if prelacteal feed is given and therefore the conclusion was misleading.

Prelacteal feeds were given by 4.4% mothers in this study. This was much lower in comparison with studies in Hangzhou(Qiu et al., 2007) and Xinjiang Province(Xu et al., 2007) in China where 26% and 52% of the infants were given prelacteal feeds respectively. However, there is a similarity between the current study and Qiu's study where the most common type of prelacteal feed in both studies were infant formula and plain water or glucose water. In Pakistan, animal milk, water, desi ghee and tea with herbs are sometimes fed to the newborns during the first 3 days of life (Khadduri et al., 2008). Another type of prelacteal feed given was herbal water (Anita A, 1997). In Ethiopia, between 14.4% and 62% infants were given fresh, unsalted butter in the belief that it will clean the stomach. Sugar water and unboiled cow's milk were also common prelacteal feeds (Getahun et al., 2004).

From the multivariate analysis, factors which were statistically significantly associated with prelacteal feeds in this study were 'mother's age' (p=0.045, Adjusted Odds Ratio=2.65, CI=1.16-6.08), 'mother's religion' (p=0.016, AOR=5.06, CI=1.67-15.28) and 'mother's education level' (p=0.041, AOR=1.26, CI=0.47-3.34). Older mothers, being a Buddhist and mothers with higher educational level have

higher odds of giving prelacteal feeds. This finding was contrary to the finding by Qiu et al. (2007) where mothers who were more educated were less likely to give prelacteal feeds to their infants but is similar to the study in Mexico by PerezEscamilla et al. (1996) that higher maternal education was positively associated with milk-based prelacteal feeds. Other factors which had been reported to have positive association with prelacteal feeds were primiparity, male infants, maternal employment, Caesarean delivery and late breastfeeding initiation (PerezEscamilla et al., 1996).

5.2.2 IOWA Infant Feeding Attitude Scale (IIFAS)

The mothers' IOWA Infant Feeding Attitude Scale (IIFAS) scores were at an average level of attitudes that favour formula feeding based on the low mean IIFAS scores (57.25), despite the higher breastfeeding initiation rate (95.6%) and longer breastfeeding duration among them (80.7% mothers were still breastfeeding at 6 months). One possible reason for this was that mothers in this study could actually have preferred formula feeding but due to economic constraint they adhere to breastfeeding as the only option of infant feeding that is available.

In this current study, there was a strong correlation between the IIFAS score with the duration of exclusive breastfeeding but there was no correlation with 'any breastfeeding' duration. A consistent association has previously been reported between IIFAS scores and infant feeding method. Scott et al. (2004) reported that breastfeeding mothers in her study had significantly higher total attitude scores (favouring breastfeeding) when compared with mothers who chose to formula feed, indicating that the IIFAS had validity in terms of predicting choice of feeding method because higher IIFAS scores mean they favours breastfeeding and that these mothers were also those who breastfed their infants. She found that a woman who scored 65 on the IIFAS was more than 4 times as likely to breastfeed as a woman with a score of 55.

However, in this study, although the mean IIFAS score was 55 (which showed the attitude of favouring formula feeding) the percentage of women who breastfed was relatively high. Changes in IIFAS scores showed that there were significant differences between IIFAS groups at antenatal with IIFAS groups at 3 months and 6 months. At the antenatal interview, 15.4% mothers scored ≥65 while at 6 months

18.9% mothers scored ≥65 on total IIFAS scores. This showed that mother's opinion and knowledge of breastfeeding changed very little with the experience of birth and breastfeeding.

The IIFAS scores of 21.1% of the mothers increased from the antenatal period to 3 months postpartum, but during the same period 26.5% decreased in IIFAS scores. The changes were similar from 3 months to 6 months. This indicated that in some mothers, attitude and knowledge about breastfeeding which were developed during antenatal may have been altered by their breastfeeding experience.

In this study, mean IIFAS scores at antenatal, 3 months and 6 months were about 57±8. This score reflects neutral attitudes towards infant feeding. According to Dungy et al. (2008), women's expressions of neutrality suggest that their attitude are not fully formed and they may be ideal target for focused breastfeeding intervention. Mothers who score below 40 on IIFAS should be offered closer support of breastfeeding. In Malaysia, breastfeeding education classes are being offered to all mothers who attended the government health clinics for antenatal check-ups.

5.3 Factors associated with antenatal and postpartum depression

5.3.1 Prevalence of antenatal depression

In this study, the Edinburgh Postpartum Depression Scale was used to assess the prevalence of depressive symptoms among mothers during the antenatal visit which was between 36 and 38 weeks of gestation. At this antenatal examination, the prevalence of depressive symptoms was 13.8%. Kadir et al. (2006) study among 377 women in a district in the east-coast of Peninsular Malaysia reported a prevalence of 30.2% at 36-42 weeks of pregnancy. The prevalence in this current study was much lower compared to the study of Kadir et al. (2006) although both these studies used the same measurement tool (validated EPDS in Malay language) and cut-off points. An explanation for the disparity between the results of this study and that of Kadir's is that the period of antenatal assessment in Kadir's study was longer (36-42 weeks of gestation) and towards the very late period of pregnancy and that hormonal changes may play a role in the development of postpartum depression in her study.

A systematic review of the literature on prevalence of depression during pregnancy of 21 studies (n=19284) reported that the prevalence (95%CI) were 7.4% (2.2-12.6), 12.8% (10.7-14.8) and 12.0% (7.4-16.7) for each trimester, respectively (Bennett et al., 2004). Another review of the Asian literature on 86 studies reported that depression during pregnancy is about 20% (Roomruangwong and Epperson, 2011). Most recently, Schatz et al. (2012) who conducted a review of the literature on antenatal depression in East Asia concluded that the incidence of depression during pregnancy in East Asia appears to be roughly equal to the West. However, no specific prevalence rate was mentioned.

Reported prevalence of antenatal depression is shown in Table 5.1 below.

Table 5.1: Prevalence of antenatal depression in other countries

Country	Sample size	Time frame (antenatal)	Diagnostic Tool	Prevalence (%)
Sweden (Josefsson et al., 2001)	1558	35-36 weeks	EPDS≥10	17
India (Chandran et al., 2002)	359	34 weeks	CIS-R	16.2
Sweden (Rubertsson et al., 2003)	3011	15 weeks	EPDS>14	8.0
Japan (Kitamura et al., 2006)	286	late pregnancy	Structured Interview	5.6
Malaysia (Kadir et al., 2006)	377	36-42 weeks	EPDS≥12	30.2
Australia (Milgrom et al., 2008)	35374	throughout pregnancy	EPDS>12	8.9
United States (Fairlie et al., 2009).	1436	26-28 weeks	EPDS≥13	9.0
Jordan (Mohammad et al., 2010)	353	last trimester	EPDS≥13	19
Israel (Glasser et al., 2012)	1254	26 weeks	EPDS≥10	20.8

EPDS indicates Edinburgh Postpartum Depression Scale; CIS-R Clinical Interview Schedule Revised

Table 5.1 above shows the prevalence of antenatal depression in some studies. It showed that the prevalence varies between countries, with different diagnostics tools, cut-off points and time of measurement.

5.3.2 Prevalence of postpartum depression

The prevalence of postpartum depressive symptoms (EPDS≥12) in this study was 7.6%, 7.2% and 8% respectively at 1 month, 3 months and 6 months postpartum. This study shows that there was a decrease in the prevalence of depressive symptoms from antenatal to postpartum. Similarly, Kadir et al. (2006) who used 12 as the EPDS cut-off point also shows a decrease in the prevalence from antenatal to postpartum which were 30.2%, 22.8% and 20.7% at late pregnancy, 1 week and 4-6 weeks respectively among 377 women in her study in the year 2000.

Another Malaysian study in 1995 (n=154 women) reported a prevalence of 3.9% at 6 weeks postpartum (EPDS≥13) (Kit et al., 1997) which was lower than this study. Mahmud et al. (2002) reported a prevalence of 9.8% at 6 to 8 weeks postpartum among 174 women in his study in 1998. However, Mahmud used the General Health Questionnaire (GHQ) and Clinical Interview Schedule (CIS) and applied the criteria for depressive episodes according to the International Classification of Diseases (ICD-10) in his study.

One other Malaysian study which had used the M.I.N.I. tool (Mini International Neuropsychiatric Interview) in a cross-sectional study of 411 urban mothers in Kuala Lumpur in 2008-2009 reported a prevalence of 6.8% depressive symptoms at 6-8 weeks postpartum (Zainal et al., 2012). This prevalence was similar to the findings of this current study which was 7.6% at 1 month postpartum. It is important to note that all other Malaysian studies were based on smaller sample sizes compared to this study.

Table 5.2: The prevalence of postpartum depression reported in Malaysian studies

Year	Sample size	Time frame (postpartum)	Diagnostic Tool	Prevalence (%)
1995 (Kit et al., 1997)	154	6 weeks	EPDS≥13	3.9
1998 (Mahmud et al., 2002)	174	6-8 weeks	CIS/ICD10	9.8
2000 (Kadir et al., 2006)	377	4-6 weeks	EPDS≥12	20.7
2005 (Kadir et al., 2009)	293	1-5 days 4-6 weeks	EPDS≥12	22.5 27.3
2008-2009 (Zainal et al., 2012)	411	6-8 weeks	M.I.N.I.	6.8
2009-2010 (this study)	1598	4 weeks	EPDS≥12	7.6

EPDS indicates Edinburgh Postpartum Depression Scale; CIS-Clinical Interview Schedule; ICD-International Classification of Diseases; M.I.N.I.-Mini International Neuropsychiatric Interview

Table 5.2 above shows the prevalence of postpartum depression from Malaysian studies. It is not appropriate to make a direct comparison because these studies use different diagnostic tools and/or cut-off point and time frame with the current study. Also, the studies in 1995 and 1998 used much smaller sample size than this study.

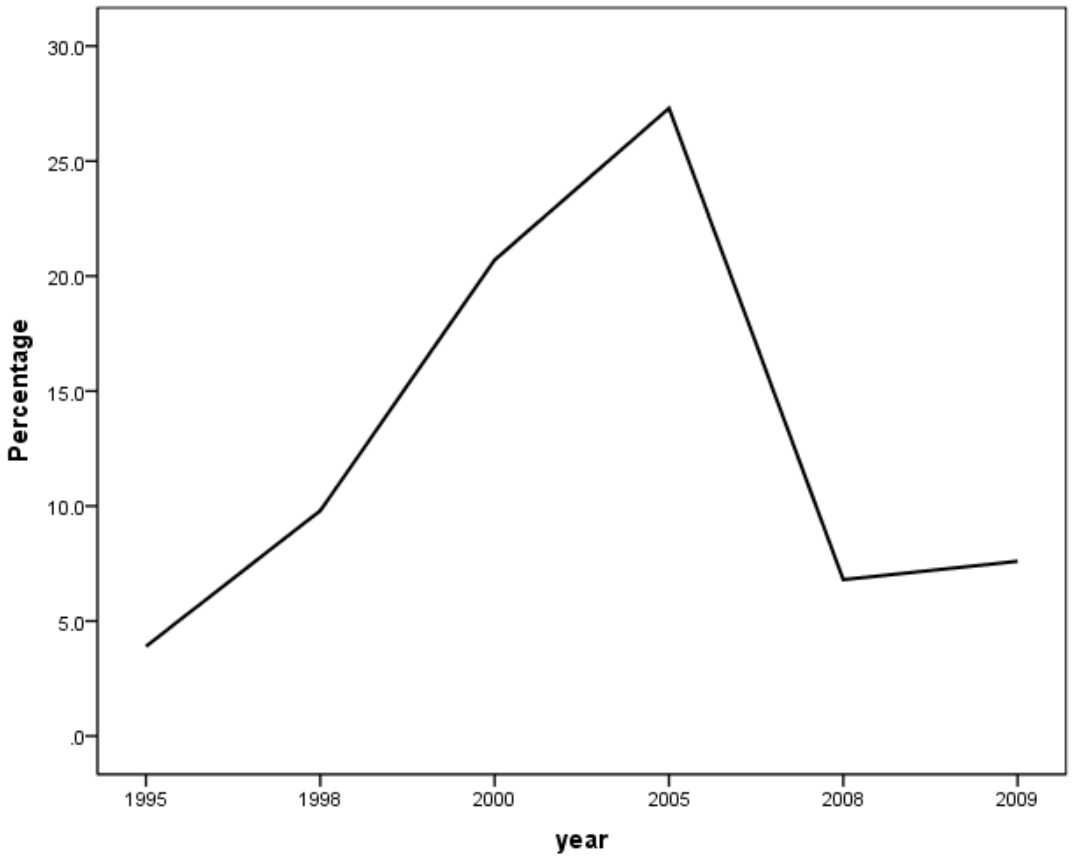

Figure 5.3: Prevalence of postpartum depression in Malaysia

Figure 5.3 above shows the rates of postpartum depression in Malaysia. The graph shows that the rate increased from 1995 to 1998 and was at its peak in 2005. Then, there was a decreasing trend in the prevalence in 2008 but it increased a little in 2009. The trend for perinatal depression could be increasing again due to the increasing prevalence in risk factors for postpartum depression. Furthermore, mental health problems in the general population appear to be increasing globally and by the year 2020, WHO projected that depression will become the second cause of global disease burden (WHO, 2001).

One possible reason why there was a lower prevalence of postpartum depression in this study could be based on the observation of Labbok (2001) observation that in countries in which exclusive breastfeeding is the norm, the incidence of postpartum depression peaks at around 9 months postpartum. This study only involved follow-up of mothers to 6 months postpartum, and it is possible that there could be higher rate at 9 months postpartum because there was an increasing trend in the

prevalence where the percentages of mothers with depressive symptoms was 7.6% at 1 month, 7.2% at 3 months but rose to 8% at 6 months. However, there have been no reported studies to confirm her observation and the trend in this study is neutral.

A review of the literature found 64 studies that have reported prevalence rates of postpartum depression in Asian countries which ranged from 3.5% to 63.3% and that at the time of the review, Malaysia was reported to have the lowest prevalence of postpartum depression (3.9%) while Pakistan had the highest (Klainin and Arthur, 2009). In another review of the Asian literature that included 86 studies, the prevalence of postpartum depression varied greatly from 1% to 73.7% (Roomruangwong and Epperson, 2011). Both reviewers used similar inclusion criteria which were i) conducted in Asian countries and ii) articles were published in English. The review of Klainin and Arthur (2009) involved studies between 1998 and 2008 while Roomruangwong and Epperson (2011) used a longer time frame which was from 1968, 1970 and 1982 from selected databases.

Table 5.3: Prevalence of postpartum depression with EPDS≥12 in Asian countries

	Country	Sample size	Time frame (postpartum)	Prevalence (%)
1	India (Patel et al., 2002)	252	6-8 weeks 6 months	23 22
2	Lebanon (Chaaya et al., 2002)	396	4-5 months	21
3	Malaysia (Kadir et al., 2006)	377	1 week 4-6 weeks	22.8 20.7
4	Malaysia (Kadir et al., 2009)	293	1-5 days 4-6 weeks	22.5 27.3
5	Nepal (Ho-Yen et al., 2007)	426	5-10 weeks	4.9
6	Pakistan (Husain et al., 2006)	175	3 months	36
7	Vietnam (Fisher et al., 2004)	506	6 weeks	33
8	Turkey (Danaci et al., 2002)	257	0-6m	14
9	Turkey (Ekuklu et al., 2004)	178	6 weeks	40.4
10	Turkey (Ayvaz et al., 2006)	152 132	6-8 weeks 6 months	29.6 11.4
11	Turkey (Dindar and Erdogan, 2007)	679	1st year	25.6

Table 5.3 above shows the prevalence of postpartum depression from studies which had used EPDS with a cut-off level of ≥12 that had been conducted in Asian countries. These rates among Asian women have shown that postpartum depression is not only a public health problem in Western countries, but also in Asian countries. In table 5.3, a study from Nepal shows the lowest prevalence of postpartum depression at 4.9%, while Turkey had the highest prevalence (40.4%). The two studies from Malaysia had a prevalence of 20.7% and 27.3% at 6 weeks postpartum based on the cut-off points of 12 and above on the EPDS.

Internationally, a literature review involving 143 studies (1980-2005) from 40 countries reported rates of postpartum depression between 0 and 63% (Halbreich and Karkun, 2006b). Another systematic review of 28 articles (1980-2004) from developed countries reported that the prevalence of perinatal depression is 6.5-12.9% (Gavin et al., 2005). An earlier meta-analysis of 84 studies published in the decade of 1990s found a prevalence rate of 10-15% (Beck, 2001).Affonso et al. (2000) examined the level of postpartum depressive symptomatology in 892 mothers from 9 countries which represented five continents demonstrated that depression was most frequent in India (32%), Korea (36%), Guyana (57%) and Taiwan (61%) while Sweden (13%) and Australia (15.7%) had the lowest rate.

Table 5.4: Prevalence of postpartum depression with EPDS≥12 in other countries

	Country	Sample size	Time frame (postpartum)	Prevalence (%)
1	United States of America (Georgiopoulos et al., 1999)	909	6 weeks	11.4
2	United States of America (Yonkers et al., 2001)	802	4 weeks	16
3	Brazil (Benvenuti et al., 1999)	113	8-12 weeks	38.9
4	Brazil (Lawrie et al., 1998)	180	6 weeks	36.9
5	Israel (Fisch et al., 1997)	327	6-12 weeks	5.2
6	Ireland (Crotty and Sheehan, 2004)	625	6 weeks	27
7	Morocco (Agoub et al., 2005)	144	2-3 weeks	20.1
8	Hong Kong (Lee et al., 1998)	145	6 weeks	11.3
9	Hong Kong (Leung et al., 2005)	269	6 weeks	19.8
10	Hong Kong (Cheng et al., 1994)	143	6 weeks	18.2
10	Greece (Thorpe et al., 1992)	165	4 weeks	13.0
11	United Kingdom (Hearn et al., 1998)	176	0-42nd day	17.0
12	United Kingdom (Edge et al., 2004)	White 200 Caribbean 101	6 weeks	White 38 Caribbean 26
13	United Kingdom (Ramchandani et al., 2005)	11833	8 weeks	10.0
14	New Zealand (McGill et al., 1995)	1330	6-9 months	20.0
15	Australia (Willinck and Cotton, 2004)	358	6-8 weeks	7.0
16	France (Fossey et al., 1997)	126	3 days	11
17	France (Sutter-Dallay et al., 2004)	497	6 weeks	5.8

Table 5.4 above shows the prevalence of postpartum depression from studies in other countries that had used the score of 12 and above with the Edinburgh Postpartum Depression Scale (EPDS). The lowest rate was 5.8% from a study in France while the highest was 38.9% which was in Brazil. These rates and the rates from Asian countries showed a close similarity and again showed that postpartum depression was not only a public health problem in Asia, but in all countries where studies have been undertaken.

Among the 942 mothers in this study who had attended all the four interviews, 25% had depressive symptoms on at least one occasion and less than 1% was found to have depressive symptoms on all the 4 occasions. In one Swedish study involving 1558 women, 1.1% scored above the cut-off points (EPDS≥10) in all assessments (Josefsson et al., 2001). Chung et al. (2004) reported that 12% of 774 mothers in his study in Philadelphia were depressed (CES-D≥16) at all 3 times points (first prenatal visit, 3-4 months postpartum and 9-12 months postpartum) which was categorized as persistent symptoms.

In this study, the prevalence of antenatal depression was higher than the prevalence of postpartum depression. Similarly, in a prospective cohort study of 559 Singaporean women, Chee et al. (2005) found a depression rate of 12.2% (EPDS≥7, SCID-IV) throughout antenatal period but this rate fell to 6.8% at 6 weeks postpartum. Josefsson et al. (2001) also reported that the frequency of depressive symptoms among the Swedish (n=1558) was higher during late pregnancy (17%) and while in the maternity ward (18%) than at the two postpartum assessments (13% at 6-8 weeks and 6 months postpartum). In another Swedish study of 434 women, the prevalence of depressed moods (EPDS≥10) was 21% at 2 months antenatal, 17% at 2 months postpartum and 12% at 1 year postpartum (Seimyr et al., 2004). Glasser et al. (2012) more recently, studied depression rate during antenatal (n=1254) and postpartum depression (n=2326) among Israeli Arab women. She reported that the depression rate was 20.8% measured at the 26th week of gestation and 16.3% at 6 weeks postpartum as measured by the EPDS (≥10).

However, in some studies, the prevalence of depression was higher in the postpartum rather than during the antenatal period. In a rural area in India (n=359), the prevalence of depression (CIS-R) was reported as 16% during the antenatal period (>34 weeks gestation) but rose to 19.8% during the postpartum period (6-12

weeks postpartum) (Chandran et al., 2002). Mohammad et al. (2010) reported a prevalence of 19% at antenatal (last trimester of pregnancy) (EPDS≥13), 22.1% at 6-8 weeks postpartum and a similar prevalence (21.2%) at 6 months postpartum among 353 women in Jordan. In a small longitudinal study (n=106) in the USA by Beeghly et al. (2002), maternal depression scores were highest at 2 months postpartum and did not change significantly from 3 to 12 months postpartum. She concluded that postpartum depression was relatively stable, but the size of her sample is much smaller than this study. However, while all these papers reported differences, a recalculation of the results showed that none of the differences were significant.

One of the possible contributing factors for the higher depressive symptoms during the antenatal period than in the postpartum period in this study is that after delivery, women of the Asian cultures received more social support than during the antenatal period. In Asia, it is a custom that after the childbirth, mothers return to their parents' house and observe the confinement period with specific traditional practices and routines (Chee et al., 2005, Kadir et al., 2006, Pillsbury, 1978). Otherwise, parents or other female family members would live with them to help with house chores and taking care of the baby. These kinds of support could help relieve the depressive moods of the mothers. Further explanations on the role of confinement practices and social support are discussed in other sections in this chapter.

5.3.3 Risk factors associated with antenatal depression

The existence of risk factors indicate only the likelihood that women who are exposed to them will subsequently develop certain conditions. Risk factors or predictors are characteristics associated with an increased risk of being developed the specific condition. Some risk factors are inherited and/or modifiable whereas others are not (Harkness, 1995). In this chapter, potential risk factors are studied using univariate and multivariate levels of analysis.

5.3.3.1 Univariate Analysis

In this study, from the univariate analysis, two demographic factors were identified as risk factors for antenatal depression, which were mother's marital status and mother's education level. There was a significant difference in marital status (p=0.003) and education level (p=0.034) between the mothers with depressive symptoms and mothers without depressive symptoms.

Marital status

Married women were twice as likely (OR=2.101; 95%CI 1.264-3.493; p=0.004) to have depressive symptoms than 'single/not living with husband/divorced' women. Being married could mean that these women faced problems in marital relationship and also less time for socializing which could result in depression. Another possible reason for this could be due to the fact that married women could be living with their mothers-in-law as it is the custom for Asian women. Conflicts with mothers in-law has been reported in the literature as one of the risk factors for antenatal and postpartum depression (Lee et al., 2004, Chandran et al., 2002, Danaci et al., 2002, Green et al., 2006, Mohammad et al., 2010). Other contributing factors could play a role such as burden of housework and childcare.

Mother's education

Mother's education level was significantly different between the mothers with depressive symptoms and mothers without depressive symptoms. Those with lowest education level showed highest risk of having depressive symptoms (OR=1.415; 1.065-1.882; 0.041). Many studies have reported a low education level as a risk factor for depression (Wang et al., 2003, Chaaya et al., 2002, Chien et al., 2006, Inandi et al., 2002, Ekuklu et al., 2004). Being on the lower side of the education level could mean that they are unemployed and are also financially deprived. Unemployment and poverty were also reported to be risk factors in the literature (Chaaya et al., 2002, Aydin et al., 2005, Inandi et al., 2002, Chandran et al., 2002, Patel et al., 2002, Rodrigues et al., 2003, Andajani-Sutjahjo et al., 2007).

At the univariate level, other significant factors between the mothers without depressive symptoms and mothers with depressive symptoms were 'marriage satisfaction' (p<0.001), 'using family planning' (p=0.018), 'happy with pregnancy'

(p=0.001), 'planned pregnancy' (p<0.001), 'worry during pregnancy' (p<0.001) and 'having problems during pregnancy' (p<0.001). Each of these factors will be discussed in detail in the following section as they are also significant in the multivariate model.

5.3.3.2 Multivariate level

At the multivariate level, the binary logistic regression analysis was used. All the variables in the questionnaire at the antenatal visit were entered into this model. The variables are 'age', 'ethnic group', 'religion', 'marital status', 'marriage duration', 'mother's education level', 'mother's employment status', 'household income', 'satisfaction with marriage', 'on family planning', 'happy with pregnancy', 'planned pregnancy', 'worry during pregnancy' and 'baby's father preference in infant feed'.

From the model, significant risk factors for antenatal depression are as listed in Table 5.5 below:

Table 5.5: Risk factors for antenatal depression (multivariate)

Factor	**AOR (95%CI)**	**p-value**	**Risk factor in the literature**
Household income	0.649 (0.434, 0.971)	0.036	Low income
On family planning	1.714 (1.241, 2.369)	0.001	Planned pregnancy
Happy with the pregnancy	0.403 (0.191, 0.850)	0.017	Planned pregnancy
Planned pregnancy	0.464 (0.340, 0.634)	<0.001	Planned pregnancy
Worry during pregnancy	3.043 (2.244, 4.126)	<0.001	Antenatal anxiety

Low income

Mothers from the lowest income group had the highest odds of developing antenatal depression. This finding is in line with the literature that pregnant women of low socioeconomic status appear to have higher rates of depression than the general pregnant population (Bennett et al., 2004) and that low income is one of the risk factors for antenatal depression (Leigh and Milgrom, 2008). Gavin et al. (2005) also reported that prevalence of major depression is similar among socio-economic status groups but minor depression may be more prevalent among lower socioeconomic status groups. In one study, financial hardship was the only risk

factor that differentiated women with antenatal depression who continued to be depressed after delivery from those who recovered (Chandran et al., 2002).

Unplanned/unwanted pregnancy

Another risk factor for antenatal depression in this study was having an unplanned pregnancy, which was highly statistically significant. Due to the fact that these women were generally from a lower socioeconomic background, an unplanned pregnancy may add to their economic burden. Unplanned/unwanted or having a negative attitude toward pregnancy was a common risk factor among Asian women (Roomruangwong and Epperson, 2011, Andajani-Sutjahjo et al., 2007, Eilat-Tsanani et al., 2006). Nevertheless, however, it has also been reported as a risk factor in western communities (Warner et al., 1996).

According to Kitamura et al. (1996) unplanned pregnancy possibly functions to precipitate antenatal depression only among those women with two or more children, whereas among those with no children or only one child, it is the first pregnancy that triggers the onset of antenatal depression. Kitamura et al. (1993) found a significant association between antenatal depression and the husband's response towards the present pregnancy. If he responded negatively, antenatal depression was about three times more likely to occur. Although, again this negative respond may be a symptom of dysfunction within the marriage.

Being unhappy with the pregnancy is another risk factor associated with an EDPS score indicative of depression in this study. Women who were unhappy during pregnancy were more likely to have antenatal depressive symptoms. This is a common scenario not only during the antenatal period but also during the postpartum period. This finding might suggest a combination of two things. Firstly, being unhappy could be the result of many other contributing factors such as having conflicts with significant others, having other social dilemma and many others.Westdahl et al. (2007) commented that social conflict emerged as a stronger predictor of depressive symptoms (CES-D≥16) than social support among 1047 young pregnant women in Atlanta. Secondly, 'unhappiness' may be a symptom of depression and further cohort studies, even starting before pregnancy are needed to elucidate this association.

In this study an association was found between women who were on family planning and antenatal depression. There could be some physiological explanation for this but one other possible explanation could be that majority of these women are Muslims and family planning is against the Islamic religion. Perhaps, being at the lower end of the socioeconomic status, these women had no other options but to be on family planning as advised by health professionals. No previous studies have described an association between family planning as one of the risk factors for antenatal depression. The use of family planning is a woman's right and logically may decrease unplanned/unwanted pregnancy which is another risk factor for postpartum depression (Beck, 2001).

Antenatal anxiety

Prenatal anxiety has been documented in the literature as a strong risk factor for postpartum depression (Ohara and Swain, 1996). There is some evidence to suggest that this is the most significant risk factor for antenatal depression in this study ($p<0.001$). It appeared to be statistically significant at both the bivariate and multivariate level. When asked if they are worried during pregnancy, only 23.9% of the mothers without depressive symptoms answered 'yes' to this question compared to 53.2% of the mothers with depressive symptoms and it is highly significant. This finding supports similar findings in the literature (Kadir et al., 2006, Mohammad et al., 2010).

This finding is similar to the study of Kadir et al. (2006) who found that 'worry about baby' was significantly associated with antenatal depression. According to Lee and Chung (2007), excessive worry is one of the symptoms of antenatal depression other than insomnia, tearfulness, low mood, fearfulness and panicky feelings. It had been reported that women who were defined as 'being nervous', 'shy', 'self-conscious' or a 'worrier' were significantly more likely to develop postpartum depression (Johnstone et al., 2001).

An Australian study of 367 women which aimed to identify risk factors for antenatal depression found that significant predictors for antenatal depression include low self-esteem, antenatal anxiety, low social support, negative cognitive style, major life events, low income and history of abuse (Leigh and Milgrom, 2008). Women with negative cognitive attributional styles (e.g. pessimism, anger, ruminations)

previously been shown to be good indicators of depression (Barnett and Gotlib, 1988).

In this current study, 53.2% mothers said that they were worried about the baby and childbirth. These mothers were three times more likely to develop antenatal depression than those who did not (AOR=3.043 (2.244-4.126), <0.001). Being in a low income category and of low education level could contribute to anxiety among these mothers. According to Sayil et al. (2006) who studied anxiety and depressive symptoms among 200 first-time mothers in Turkey, lower maternal income, self-esteem and self-efficacy were associated with prenatal anxiety.

Other factors found in previous studies

Roomruangwong and Epperson (2011) demonstrated that premarital pregnancy, conflict with mother in-law and dissatisfaction with infant's gender are more specific to Asian cultures. In India, pressure to bear a son was one of the risk factors reported (Chandran et al., 2002). Lack of support was the strongest factor associated with antenatal depressive mood in primiparous and multiparous women in 3011 mothers in Sweden (Rubertsson et al., 2003). Westdahl et al. (2007) reported that the higher the number of risk factors, the higher the proportion of depressed women in his study of 1047 mothers in Atlanta.

5.3.4 Risk factors associated with postpartum depression

5.3.4.1 Univariate level

In this study, at the univariate level, several factors were found to be statistically significantly different between mothers with depressive symptoms and mothers without depressive symptoms. These factors are grouped into associated risk factors as had been reported in the literature (Beck, 2001) and are listed in Table 3 below.

Table 5.6: Risk factors for postpartum depression in this study (univariate)

Factors in this study	**Risk factors (from the literature)**
Generally consider yourself a worrier*	Self-esteem
Generally like yourself as a person*	Self-esteem
Get practical/emotional support during confinement*	Social support
Husband helps take care of baby'**	Social support
Husband helps with housework**	Social support
Satisfaction with husband's help during confinement**	Social support
Relationship with husband**	Marital satisfaction
Happy with relationship with husband**	Marital satisfaction
Problem with childcare during confinement*	Childcare stress
Worry about baby**	Prenatal anxiety
Maternity blues**	Maternity blues
Have emotional problem during the last pregnancy**	Prenatal anxiety
Worry about baby**	Prenatal anxiety
Worry during the previous pregnancy**	Prenatal anxiety
Had major stresses, changes or losses during pregnancy**	Life stress
Have problems that haunts most of the time**	Life stress
Food taboos during confinement*	Cultural practices
Confined in the house only*	Cultural practices
Feelings about the confinement practices*	Cultural practices
Previous depression**	History of previous depression

*p<0.05
**p<0.001

Table 5.6 shows the nineteen factors in this study which are statistically significantly different between mothers with depressive symptoms and without depressive symptoms, at the univariate level. Twelve factors appeared to be strongly significantly different (p<0.001) between the two groups of mothers which are 'husband helps take care of baby', 'husband helps with housework', 'satisfaction with husband's help during confinement', 'relationship with husband', 'happy with relationship with husband', 'worry about baby', 'maternity blues', 'have emotional problem during last pregnancy', 'worry during previous pregnancy', 'had major life

events during pregnancy', 'have problems that haunts most of the time' and 'previous depression'. These factors can be grouped into associated risk factors which had been reported in the literature (Beck, 2001). Therefore, at the univariate level, risk factors of postpartum depression in this study are self-esteem, social support, marital satisfaction, childcare stress, prenatal anxiety, maternity blues, life stress cultural practices and history of previous depression.

5.3.4.2 Multivariate Level

After ascertaining the variables that were significant at the univariate level ($p<0.05$), these were then incorporated into a multivariate model (Binary Logistic Regression) together with other variables identified from the literature. Variables entered into this model were 'generally consider yourself a worrier', 'generally like yourself as a person', 'get practical/emotional support during confinement', 'husband helps take care of baby', 'husband helps with housework', 'satisfied with husband help during confinement', 'relationship with husband', 'happy with the relationship', problem with childcare during confinement', 'constantly worried about the baby', 'experienced 'Maternity blues', 'have problems which haunts most of the time', 'have emotional problem during the last pregnancy', 'worry during previous pregnancy', 'major life events during pregnancy', 'food taboos during confinement', 'confined in the house only', 'previous depression' and 'feel about the confinement practices'.

At the multivariate level, eight factors remained significant as listed in table 5.7 below:

Table 5.7: Risk factors for postpartum depression (multivariate)

Factors in this study	**Adjusted Odds Ratio (95%CI)**	**p-value**	**Risk factors from the literature**
Generally consider yourself a worrier	1.859 (1.039, 3.328)	0.037	Self-esteem
Husband helps take care of baby	0.208 (0.070, 0.621)	0.005	Social support
Relationship with husband	0.079 (0.007, 0.862)	0.037	Marital relationship
Happy with relationship with husband	0.103 (0.019, 0.551)	0.008	Marital relationship
Maternity blues	3.227 (1.823, 5.712)	<0.001	Maternity blues
Have emotional problem during the last pregnancy	1.978 (1.089, 3.590)	0.025	Prenatal anxiety/depression
Food taboos during confinement	1.976 (1.164, 3.355)	0.012	Traditional practice*
Previous depression	1.982 (1.174, 3.344)	0.010	Previous depression

*This factor is not one of the 13 risk factors by Beck (2001)

Table 5.7 above shows that from the Binary Logistic Regression analysis, 7 risk factors were found to be coincide with the literature (Beck, 2001). Another risk factor found in this study which is 'traditional practice' had also been reported in other studies in Asia (Grace et al., 2001, Kadir et al., 2006).

The Generalised Estimated Equation (GEE) Analyses were applied to test for the effect of 'full breastfeeding' and 'any breastfeeding' durations on postpartum depression. In the GEE model for 'full breastfeeding', factors which were significantly associated with postpartum depression were 'household income' [AOR=3.235, (95%CI=1.054, 9.928)], 'husband helps in taking care of the baby' [2.8 (1.150, 6.819)] and 'having problems most of the time' [0.329 (0.204, 0.530)]. In the GEE Model for 'any breastfeeding', factors appeared to be significantly associated were 'husband helps in taking care of baby' [3.059, (1.258, 7.436)] 'have problems most of the time' [0.325 (0.202, 0.522)] and 'problems with childcare during confinement' [0.604 (0.384, 0.949)].

These factors are respectively corresponding with socioeconomic status, social support, life stress and childcare stress in the literature. Therefore, in total, from the logistic regression analysis and the GEE model, the ten factors that were identified as the risk factors for postpartum depression in this study are:

1. Previous depression
2. Self-esteem
3. Childcare stress
4. Marital satisfaction
5. Maternity Blues
6. Prenatal anxiety/depression
7. Social support
8. Socioeconomic status
9. Life stress
10. Traditional practices

Previous depression

Previous depression was significantly associated with postpartum depression in this study. Other studies have consistently reported previous depression as one of the risk factors for postpartum depression (Lee et al., 2000, Lee et al., 2004, Eilat-Tsanani et al., 2006, Ho-Yen et al., 2007, Chee et al., 2005, McCoy et al., 2008, Eberhard-Gran et al., 2002).

Ohara and Swain (1996) reported that prenatal depression was a strong predictor of postpartum depression. Women who have had postpartum depression in previous pregnancies are more prone to the illness compared to those who have never had it. Women who for various reasons already are vulnerable to depression are at risk for experiencing depressive episodes later in life, including the postpartum period. An Australian study of 35374 women, of whom 8.9% were depressed antenatally, identified previous depression as one of the key antenatal risk factors for postpartum depression (Milgrom et al., 2008). A study which compared the prevalence of depression in postpartum and non-postpartum women in Norway (n=416) showed that a history of depression was associated with depression in both groups of women (Eberhard-Gran et al., 2002).

Najman et al. (2000) who conducted a study on 8556 pregnant mothers in Queensland, Australia reported that the majority of cases of depression experienced at the 5 year follow-up represent a recurrence of a previous experience of depression. It represented recurrences of pre-existing illness rather than new cases of depression in the postpartum period. In Malaysia, a study of 411 mothers reported that postpartum mothers with previous history of depression and mothers

with family history of depression were significantly associated with postpartum depression (OR20.6, 95%CI5.2-81.9) and (OR15.4, 95%CI10.8-22.9) respectively.
In this current study, 21.4% (330/1545) mothers reported that they had been depressed before and 18.5% of these (61/330) had depressive symptoms at the time of the assessment (EPDS≥12 at the 1 month interview). In the multivariate analysis, mothers who had previous depression were twice as likely to have depressive symptoms at the current state. These mothers who are at higher risk in having depressive episodes in future should be identified and targeted for appropriate interventions.

Self esteem

Self-esteem refers to a woman's global feelings of self-worth and self-acceptance. It is her confidence and satisfaction in her-self. A low self-esteem reflects a negative self-evaluation and feelings about oneself or one's capabilities (Beck, 2001). Mothers with high levels of self-esteem have the ability to withstand stressors that may jeopardize this sense of self-worth and contribute to the development of postpartum depression. Low self-esteem had also been reported to be a significant predictor of antenatal depression in a study of 367 Australian women (Leigh and Milgrom, 2008) and a predictor of postpartum depression among Taiwanese and Chinese (Wang et al., 2003).One earlier study on 738 women in the United States showed that mothers with low self-esteem were 39 times more likely to have high depressive symptoms than those with high self-esteem. It is interesting to note that 42% of the mothers in this study were depressed (CES-D≥16) (Hall et al., 1996).

In this current study, two questions on self-esteem ('generally consider oneself a worrier' and 'generally like oneself as a person') were found to be significantly different between the mothers with depressive symptoms and those without. At the multivariate level, the adjusted odds ratio shows that mothers who generally considered themselves as a worrier were almost 2 times more likely to develop depressive symptoms. These mothers probably got worried over small problems which could be handled easily by other women and get stressed unnecessarily. Being in a vulnerable state in the postpartum period, women with low self-esteem should be referred to clinicians as not to worsen her mental status which could lead to depression.

Childcare stress

A meta-analysis of 44 studies on various predictor variables found that childcare stress and life stress were major predictors of depression and only prenatal depression had a greater effect size (Beck, 1996).

According to Rahman and Creed (2007), having 5 or more children was significantly associated with persistent depression in their study among 701 Pakistani women. This was supported by Leung et al. (2005) who measured stress related to childcare with the Childcare Stress Inventory on 385 Hong Kong Chinese women. She found that both depressed and non-depressed group experienced stress related to childcare but those with depression reported higher levels.

In a study by Najman et al. (2000) on 8556 pregnant women in Queensland, rates of depression at the 6 months follow-up were relatively low compared to the rates at about 18 weeks gestation, 3-5 days after childbirth and at the 5 years follow-ups. Mothers appear to experience increasing levels of symptoms of depression as their child grows up where the rates of depression were highest at the 5 year follow-up other than at the 18 weeks gestation.

In this study, problem with childcare during confinement was a significant risk factor for postpartum depression in the GEE model which test for the effect of 'any breastfeeding' duration on postpartum depression. Problems with childcare could be very stressful especially to those with many small children. Among Asian women, the main burden of childcare is always the responsibility of the mother while their husbands are away working during the day. Being a housewife with low social support from the husband, relatives and other family members may place the mother in a very difficult situation where she has no one to turn to for help and eventually end up having depression if urgent help is not received to her rescue. This theory is supported by Green et al. (2006) who, in her study of 137 Arab women found that first time mothers had higher depression scores than did multiparous mothers. She commented that a plausible reason is the existence of housemaids and extended family members who help reduce workload and stress in multiparous mothers in her study.

Marital relationship

In this study, two factors on marital relationship, 'relationship with husband' and 'happy with the relationship' are highly significantly different ($p<0.001$) at the bivariate level between mothers with depressive symptoms and those without depressive symptoms. These factors were also statistically significantly different at the multivariate level.

While one meta-analysis reported that poor marital relationship was one of the strongest predictors of postpartum depression (Ohara and Swain, 1996), another meta-analysis computation revealed a moderate relationship between marital relationship and postpartum depression (Beck, 2001). According to Ohara and Swain (1996), the state of a woman's marital relationship during pregnancy is a relatively clear risk factor for postpartum depression.

In the United States, Logsdon et al. (1994) found that in a sample of 105 women, postpartum closeness to husband is independently related to less depression during postpartum. In another study of 119 first-time mothers in London, marital conflicts and severe doubts about having the baby were associated with depression at both antenatal and postpartum periods (Kumar and Robson, 1984). Although marital conflicts could be the consequence of postpartum depression, Kumar and Robson (1984) pointed out that in their study, marital conflict happened before there were signs of clinically significant emotional disturbance in the mother. Another study among 559 Singaporean mothers also found marital dissatisfaction as one of the factors associated with postpartum depression (Chee et al., 2005).

In a community cohort of 288 Israeli women, psycho-social factors (specifically, marital disharmony, poor social support, past emotional problems, depressive symptoms during pregnancy and prolonged infant health problems) have greater influence on the development of postpartum depression than either demographic or medical factors (Glasser et al., 2000). Lee et al. (2004) who conducted a study among 781 Hong Kong Chinese reported that women who had marital dissatisfaction were 2.36 times more likely to develop postpartum depression. In one Malaysian study of 174 women, a higher percentage of women with marital problems was found in the depressed group compared to the non-depressed group and the difference was highly statistically significant (Mahmud et al., 2002). Financial problems were the most popular response as the source of problem in

Mahmud's study. Eberhard-Gran et al. (2002) found that having a poor partner relationship was associated with depression in both the postpartum and non-postpartum women among 416 Norwegian in his study.

While Patel et al. (2002) in India (n=252) and Gulseren et al. (2006) in Turkey (n=125) also found an association between depression and poor marital relationship, Green et al. (2006)did not find any relationship between the two among 125 Emirati women in the United Arab Emirates. However, poor relationship with mother-in-law seemed to be the risk factor for higher depression scores in her study. Note that all of these studies used small sample sizes and would only have detected a very large difference.

Marriage is an institution still upheld as one of the most important component in a Malay woman's life in Malaysia. Pregnancy, childbirth and motherhood are regarded as key life events and sources of prestige, pleasure and self-esteem (Omar, 1984). Marital relationship being a risk factor in this study could be due to the customary and belief of the society. The family system in Asia has more traditional roles especially among the less educated, low socioeconomic status group of women where the mothers tend to do a greater share of the parenting task. The demand from the newborn baby is added to the burden of childcare and could then result in the relationship between the marriage partners suffering. Among Asian women, marital conflict should be resolved privately and not shared with others. Religion could also play a role in this factor. In Islam, a wife should obey her husband in every way except in ways that are against the religion. Probably, to these women, marital conflict should not be confided to others and so eventually will become a source of stress and depression, particularly among women who are at their vulnerable state.

'Maternity blues'

'Maternity blues' is a colloquial term used to describe the transitory phenomenon of mood changes that begins within the first few days after delivery and can last 1 to 10 days or longer. It is characterized by tearfulness, anxiety, difficulty concentrating, irritability and labile moods (Beck, 1998a). 'Maternity blues' ranked 'moderate' as one of the 13 predictors of postpartum depression (Beck, 2001). 'Maternity blues'

was another risk factor in this study as reported previously in other studies (Bloch et al., 2005, Yamashita et al., 2000).

In this study, mothers were asked if they felt sad unnecessarily within the first week after childbirth. 28.2% mothers with depressive symptoms answered 'yes' to this question and was statistically significant ($p<0.001$) between mothers with depressive symptoms and those without depressive symptoms. The prevalence of maternity blues in this study was 10.2%. A study on 88 Japanese mothers reported that 24% mothers had maternity blues at 3 months postpartum (Yamashita et al., 2000).

In Israel, a study by Bloch et al. (2005) on 1800 women found 'mood symptoms during the first 2-4 days postpartum as significant risk factor for postpartum depression. Maternity blues and past depression were the two strongest predictors of postpartum depression in this study and was significantly more prevalent in women with past depression than in women without a history of depression.

A recent study on 551 Japanese revealed that maternity blues (defined as a score of eight and above on the Stein Maternity Blues Scale) was significantly associated with high EPDS score at 1 month postpartum. The women who experienced maternity blues had 5.5 times the risk of having of having high EPDS scores (Ishikawa et al., 2011). In this study, 28.8% (122/423) of the women suffered from maternity blues as detected by Stein's Scale during the 5 days after delivery with the highest prevalence on the first day and fluctuated until the fifth day which a decrease in the prevalence. Among 853 women in Germany, 55.2% women were found to have maternity blues (based on symptoms) and that there was a significant association between maternity blues and postpartum depression with an odds ratio of 3.8 (Reck et al., 2009).

A study was conducted among 103 first time mothers in North Staffordshire in England to test the hypothesis that severe blues [above 75th percentile on 'Blue Questionnaire' (Kennerley and Gath, 1989)] increases the risk of depression in the six months following childbirth (Henshaw et al., 2004). It was found that women with severe blues were almost 3 times more likely to develop depression than those without. It was also reported that women with severe blues and a past history of depression were almost 6 times more likely to develop postpartum depression. In 18 women with severe blues who became depressed, the onset of depression was identified as occurring in the first week postpartum.

Although maternity blues in this current study was not assessed using a specific instrument, the reasonable percentage of mothers who experienced maternity blues and the confirmation of it as a significant predictor for postpartum depression in the literature deserve attention. More may be gained by targeting interventions at women already experiencing significant mood change early in the postpartum period. It would appear that 'maternity blues' is actually measuring depression and it is likely that there would be a high degree of correlation between these two states.

Prenatal anxiety /depression

In this current study, 35.38% of the mothers who had depressive symptoms antenatally had depressive symptoms at least once during the postpartum period. Mothers who reported to be having emotional problems during the last pregnancy were almost two times more likely to be having depressive symptoms than their counterparts (AOR1.978,95%CI 1.089-3.590). Despite of being a risk factor for antenatal depression, prenatal anxiety is also a predictor for postpartum depression in this study.

A review of the literature on 84 studies published between 1990 and 1999 (Beck, 2001) and between 1990-2002 on 22000 subjects (Robertson et al., 2004) in various cultures worldwide suggests that anxiety experienced during the prenatal period increases the risk of postpartum depression.

Many other studies have also reported the association between prenatal anxiety and postpartum depression. In Turkey, Ayvaz et al. (2006) who studied the antenatal risk factors for postpartum depression among 192 women revealed a significant relationship between postpartum depression and Beck Anxiety Inventory scores during pregnancy. Women with postpartum depression had significantly higher mean of scores than the mean scores of women without postpartum depression. In another Turkish study of 200 first-time mothers, mother's depressive symptoms at six months after the birth were significantly associated with higher prenatal anxiety (Sayil et al., 2006).

Evidence from the literature suggested that there are many underlying factors for prenatal anxiety and depression. It has been reported that lower maternal income, low self-esteem and self-efficacy were associated with prenatal anxiety (Sayil et al., 2006) and prenatal anxiety is a strong predictor for postpartum depression (Ohara

and Swain, 1996, Beck, 1996). Therefore, women who experience any of these risk factors are actually at increased risk of becoming depressed postnatally.

A study of 400 Thai women showed that antenatal anxiety was the only significant predictor of antenatal risk factors for postpartum depression while postpartum anxiety and social support were the risk factors during the postpartum period (Liabsuetrakul et al., 2007). Among 570 women in Geneva, mothers with postpartum depression presented more feelings of anxiety and hostility (Righetti-Veltema et al., 1998).

In a study of 149 Pakistani women, higher level of psychological distress in the antenatal period was associated with high depression score (Husain et al., 2006). It had been reported that antenatal depression together with a prior history of depression and a low level of partner support were the strongest independent antenatal predictors of a postpartum EPDS score of >12 (Milgrom et al., 2008). In this cohort of 35374 Australian, women with an elevated antenatal EPDS were 5.6 times more likely to have an elevated postpartum score (Milgrom et al., 2008). Depressive symptoms during pregnancy was one of the most significant predictive variables for postpartum depression in a group of 137 Arab women in the United Arab Emirates (Hamdan and Tamim, 2011). A similar finding was also reported by Logsdon et al. (1994) in the United Kingdom (n=105).

The findings in this current study and of others showed that prenatal anxiety and prenatal depression are risk factors for postpartum depression not only in certain cultures but also in other cultures worldwide. Therefore, screening of women for these risk factors during the antenatal period would have been useful to identify women at risk for postpartum depression. These women then should be offered appropriate treatment, including counselling to help them deal with their depressive symptoms.

Social support

In this current study, ‘get practical/emotional support during confinement’ was of borderline significance (p=0.05) at the univariate level. Although ‘husband help take care of baby’ and ‘husband help with housework’ were both significant at the univariate level, the latter was not significant at the multivariate level. ‘Husband helps in taking care of the baby’ is another significant factor for postpartum

depression in this study (AOR=2.8, CI=1.150-6.819). Mothers whose husbands did not help were 2.8 times more likely to develop postpartum depression.

One possible reason for this was that mother's perception of the support received from the husband was more important than the support that was actually received. When husbands help in taking care of baby, it could be perceived by the mother that her husband really loves the baby and it is more important than the physical support she received from the husband.

A consistent association has been reported between lack of social support and postpartum depression. The lack of good social support has been repeatedly shown to be a risk factor for postpartum depression (Ohara and Swain, 1996, Beck, 2001). Several studies had demonstrated that lack of support from husband or significant other (Rodrigues et al., 2003, Husain et al., 2006, Sagami et al., 2004) and dissatisfaction with paternal support (Sayil et al., 2006) were risk factors for developing postpartum depression. Social support which was perceived as supportive and helpful was a protective factor for postpartum depression and vice versa.

It had been reported that support from the baby's father was strongly negatively related with depression severity during the postpartum period (Ohara and Swain, 1996). Women suffering from postpartum depression reported less practical and emotional support from their husbands during the postpartum period in a qualitative study of 39 mothers in India (Rodrigues et al., 2003). In a study in the United States (n=126), it was noted that postpartum depression is related specifically to a lack of support from the partner rather than to a lack of social support in general (Hopkins and Campbell, 2008).

According to Xie et al. (2009), among 534 Chinese in Hunan, China, low postpartum social support was associated with greater risk for postpartum depression (EPDS≥13) with AOR varying from 2.06-9.64. She also commented that tangible social support, such as assistance with caring for the new-born may be particularly important for the emotional well-being of postpartum women from Asian cultures. Sayil et al. (2006) reported that perceived lower satisfaction with paternal physical support was one of the risk factors for postpartum depression in his study of 200 Turkish mothers. More mothers who were satisfied with the father's contribution to both infant care and household chores had less depressive symptoms.Husain et al.

(2006) reported that, in his study of 149 Pakistani women, support from significant others (family and friends) has a protective influence on postpartum depression.

In some cultures, social support after childbirth is provided by the woman's family rather than by her husband (Yoshida et al., 2001, Mohammad et al., 2010). Despite of the positive roles of social support in the development of postpartum depression mentioned in the above studies, a study on 88 Japanese mothers in Japan and 98 in England showed that the traditional support system (*Satogeri Bunben*) received during confinement did not help reduce the onset of postpartum depression (Yoshida et al., 2001).

Because nuclear families are becoming more common than extended families in Malaysia, mothers in this current study could have practiced confinement without other family members and therefore viewed husband's help as an important factor during the confinement period. In this current study, it was possible that husband helps in taking care of baby was perceived as receiving support from the husband and that they felt closer to their husbands. According to Logsdon et al. (1994) women who felt closer to their husbands reported fewer depressive symptoms.

Problem with childcare among mothers in this current study showed that the mothers were not receiving enough social support in the postpartum period. Logsdon et al. (1994) however, found no significant relationship between support received during the postpartum period and postpartum depression. He argued that pregnant woman has expectations for postpartum support and failure to receive anticipated support may lead to negative consequences (Logsdon et al., 1994). Therefore, it is important to provide support that is perceived as 'helpful and useful' by the mother than just any kind of support.

Socio-economic status

In this current study, mothers with household income of less than RM1000 a month were three times more likely to be depressed than of those with higher household income. Other studies had also found household income as a risk factor for postpartum depression (Chandran et al., 2002, Rodrigues et al., 2003, Patel et al., 2002).

An update of the findings in an earlier meta-analysis (Beck, 1996) conducted by Beck (2001) had added four new predictors to the Postpartum Depression Predictors Inventory which were low self-esteem, single marital status, unplanned/unwanted pregnancy and low socioeconomic status. The fact that the earlier meta-analysis (Beck, 1996) was based on studies in 1980s, this addition suggested that only in more recent studies that socioeconomic status is a common predictor for postpartum depression.

In a study in Atlanta (n=1047), Westdahl et al. (2007) reported that the prevalence of depressed women was higher among women of low socio-economic status compared to their counterparts. According to Groer (2005a), depression appeared to be influenced by income, with the highest level of depression appearing in the poorest mothers. This was evidenced in a study of 183 mothers in the United States.

Rahman and Creed (2007) found that in a sample of 701 mothers from a rural sub-district of Pakistan, women who were poor and had more psychological symptoms during pregnancy are more likely to remain depressed one year after giving birth. In the multivariate analysis, poverty predicted persistent depression (depressed at all point of assessment) in that study.

In the United Arab Emirates, although Hamdan and Tamim (2011) found that women in the low income group were more likely to experience postpartum depression than those in higher income group in her study of 137 women, the opposite was reported by Green et al. (2006). She found that socio-economic status was not a risk factor for postpartum depression among 125 Arab women in her study.

In this current study, majority of the mothers (68.3%) were from the lowest income group (RM<1000) and this means that the majority of them were exposed to this particular risk factor. However, the low rate of postpartum depressive symptoms among them (7.6-8.0%) could possibly mean that some of them had higher tolerance level for this risk factor.

Life stress/major life events

Major life events were another significant risk factor for postpartum depression in this study. Major life events in this study include separation, moving house, domestic violence and bereavement. In this current study, 46.6% reported having experienced major life events since the first interview during antenatal. However, there was no significant difference between the mothers with and without depressive symptoms with regard to life events. 'Having problems most of the time' was a significant risk factor found in this study and it is highly significant ($p<0.001$, AOR=0.329, CI=0.204-0.530). This finding highlighted that these mothers had a persistent life stress. In this study of low income mothers, financial hardship was the most common problem reported and this could haunt most of the time and was difficult to settle as there are also other inter-related factors involved.

Social stress in the form of relative poverty, obstetrical difficulties and the stressful life events during pregnancy is a clear risk factor for postpartum depression (Ohara and Swain, 1996). According to Beck (2001), depression can result from a process of long-term biochemical 'loading' as a woman's brain repeatedly responds to stress in her life.

Hamdan and Tamim (2011) in a study of 137 Arab women found that stressful life event was of borderline significance as a risk factor for postpartum depression but significantly related to depressive symptoms in her other study of 224 Arab women (Hamdan et al., 2008). He also reported that the most common stressful network events were (in descending order): death of other relative, difficulty in getting along with in-laws, serious or life-threatening illness or injury of parent or other relative, serious personal crisis of sibling and death of parent.

Adverse life events in previous years had been reported as one of the risk factors for postpartum depression for 359 women in South India (Chandran et al., 2002). Having experienced two or more stressful life events was one of the strongest explanatory variable for depression in a study of national Swedish sample of 3011 mothers (Rubertsson et al., 2003). It was reported in one study that persistently depressed mothers (depressed at all points of assessments) had experienced more life events preceding the assessments than the mothers whose depressive disorders had resolved. In that study, 56% (73/129) mothers were persistently

depressed (Rahman and Creed, 2007). In this current study, only 1% mothers were persistently depressed (had depressive symptoms at all the four measurements).

In one earlier study conducted in North and South Carolina among 738 postpartum mothers, everyday stressors were more strongly associated with depressive symptoms than were major life events (Hall et al., 1996). It was being argued that life events exerted a significant but weak direct effect on depressive symptoms.

Lower self-esteem, higher everyday stressors and a greater number of life events were associated with a higher level of depressive symptoms in this study. The presence of stressful life events, in addition to predisposing to postpartum depression, could have a negative effect on lactation (Hatton et al., 2005).

Traditional practices are discussed in detail in section 5.7 as part of an objective of this study.

5.4 Effects of breastfeeding duration on postpartum depression

In this study, the Generalised Estimated Equation Model was applied to determine the effects of breastfeeding duration on postpartum depression. Variables included in this model are described in detail in Chapter Four. From this model, there was no significant effect of 'full breastfeeding' duration on postpartum depression. However, it was found that more mothers who were formula feeding had an increase in their EPDS scores from 1 month to 6 months compared to the mothers who were on 'full breastfeeding' and this is statistically significant (p=0.003).

The finding of this study is consistent with the findings of others studies (Dennis and McQueen, 2007, Chung et al., 2004, Jacobson et al., 1991). In her study of 594 Canadian, Dennis and McQueen (2007) reported that infant feeding method had no relationship with depressive symptomatology and suggested that maternal mood influences breastfeeding outcomes rather than the reverse. Similar finding was reported in one study of 93 women in Barbados, depressive symptomatology (Zung Depression and Anxiety Scales) 7 weeks after delivery was significantly related to infant feeding practices at 7 and 24 weeks but conversely, infant feeding practices did not predict maternal mood at any time (Galler et al., 1999). In a prospective

community survey in Philadelphia (n=774), Chung et al. (2004) found no significant association between maternal depressive symptoms (CES-D≥16) and breastfeeding rates but found an overall trend of declining breastfeeding rates with increasing depressive symptoms. Similarly, Jacobson et al. (1991) found no association between maternal depression (BDI) and breastfeeding at 6 months postpartum in a sample of 187 socioeconomically disadvantaged women in Detroit.

In this current study, when comparing the type of feed and the scores of EPDS, more mothers in the full breastfeeding group has lower scores on the EPDS (EPDS<12) compared to mothers who scored ≥12 and vice versa, more mothers in the formula-feeding group had depressive symptoms (EPDS≥12) than their counterparts. However, this is not statistically significant. In a sample of 2375 women in Manchester, United Kingdom, depression (EPDS>12) at six to eight weeks postpartum was found to be more common among women who were bottle-feeding. They commented that breastfeeding may enhance self-esteem and so make depression less likely (Warner et al., 1996). In a cross-sectional study conducted in Kuala Lumpur, Malaysia on 411 mothers, mothers who did not breastfeed exclusively appeared to have higher risk for postpartum depression (MINI)(OR23.7, 95%CI3.1-179.7) (Zainal et al., 2012).

Similarly, Nishioka et al. (2011) reported that among 405 Japanese, the percentage of mothers with higher EPDS score (EPDS≥9) at 5 months postpartum was significantly higher in the formula milk-based group than the breastfeeding group. The authors highlighted the fact that high EPDS score was the significant and independent factor underlying the switch from breastfeeding to formula feeding. They then suggested that mothers who change feeding pattern from breastfeeding to formula feeding should be considered as having higher risk in developing postpartum depression.

Conversely, in some studies, breastfeeding was reported to have a negative impact on postpartum depression. One of the earliest studies which had looked into the association of breastfeeding and postpartum depression was conducted in the 1980s on 89 mothers from Edinburgh, United Kingdom (Alder and Cox, 1983). They reported that women who totally breastfeed their babies for at least 12 weeks had a higher incidence of postpartum depression (Standardized Psychiatric Interview) than those who were partially breastfeeding. In other words, 45% of the totally

breastfeeding women in this study had depressive symptoms in the postpartum period compared with none of the partially breastfeeding women. The author suggested that feelings of fatigue, exclusive demands of the baby or its total dependency may also contribute to postpartum depression.

Additionally, Hatton et al. (2005) who conducted a study on 377 women in the United States reported that symptoms of depression (EPDS≥14) were significantly lower in those who were breastfeeding at 6 weeks but not at 12 weeks postpartum which suggested that outcome depended on the time of measurement. In this study, it was also found that in those who stopped breastfeeding after 6 weeks postpartum, there was a significantly greater improvement in depressive symptoms relative to those who continued to breastfeed. The author argued that some aspects of breastfeeding may have been distressful and cessation of it may have relieved the distress. However, the limitation of Hatton's study was that breastfeeding was in the form of 'yes' or 'no' and the fact that it did not take into account the exclusivity and longevity of breastfeeding, the results should be interpreted with caution.

In other studies, breastfeeding was reported to be a protective factor against postpartum depression. In one study of 377 Arab women in the United Arab Emirates, women using formula were more likely to be diagnosed with postpartum depression and women who had breastfed at all and were breastfeeding at the time of the data collection had lower scores on the EPDS (EPDS<10) than women who had not breastfeed or breastfed for a shorter period of time. Greater frequency of breastfeeding was also related to lower scores on the EPDS (Hamdan and Tamim, 2011). Groer (2005a) studied the differences of stress and moods between 84 exclusively breastfeeding, 99 exclusively formula-feeding and 33 controls. He reported that breastfeeding appears to be somewhat protective of negative moods and stress. Exclusive breastfeeding is associated with more positive moods and less perceived stress.

In a review on anti-inflammatory and maternal mental health, it was mentioned that the first goal in preventing or treating depression is to reduce maternal stress and breastfeeding and on-going breastfeeding relationship is one way to achieve this. In other words, breastfeeding that is well-established protects maternal moods by lowering stress. Breastfeeding also protects babies of depressed mothers from the effect of maternal depression (Kendall-Tackett, 2007).

The fact that there was a high breastfeeding intention (98.4%) and breastfeeding initiation (95.6%) rate in this study showed that these mothers actually had high motivation to breastfeed. Appropriate intervention should be introduced to achieve 100% breastfeeding initiation and to be able to sustain longer breastfeeding duration among them. The protective role of breastfeeding in the development of postpartum depression or at least to reduce stress should be highlighted in breastfeeding classes during antenatal visits to benefit these mothers to the optimum level.

5.5 Effects of antenatal depression on breastfeeding duration.

In this study, the Cox Proportional Hazard Regressions Analysis was applied to test for the effects of antenatal depression on 'full breastfeeding' and 'any breastfeeding' duration in two separate analyses. Details of this model are described in Chapter Four. Antenatal depression has no significant association with 'full breastfeeding' duration in this study. Previous studies of depression during pregnancy and breastfeeding intention, initiation and duration have reported conflicting findings (Chung et al., 2004, Li et al., 2008, Pippins et al., 2006, Kehler et al., 2009, Fairlie et al., 2009, Bogen et al., 2010).

One of the interesting findings in this current study is that 63.7% of the mothers without depressive symptoms intended to practise 'full breastfeeding' while only 54.3% of the mothers with depressive symptoms intended to do so. This association showed that mothers without depressive symptoms might have higher confidence in their ability to breastfeed. In terms of intended breastfeeding duration, 13.8% of the mothers without depressive symptoms intended to breastfeed for less than 6 months while 25.1% of the mothers with depressive symptoms intended to do so. Mothers without depressive symptoms in this study had longer intended breastfeeding duration than those with depressive symptoms.

The findings in this study are inconsistent with the finding of others. One study in western Massachusetts (n=274) reported that women with persistent depressive symptoms (EPDS≥13) over pregnancy were 24-33% less likely to intend to breastfeed compared to women without depressive symptoms (Insaf et al., 2011). In another study in eastern Massachusetts (n=1436), despite of being in a healthcare setting which is highly supportive of breastfeeding, women with prenatal depressive symptoms (EPDS≥13) in the second trimester were almost 2 times more likely to intend to formula feed than women without depressive symptoms (Fairlie et al.,

2009). Rondo and Souza (2007) also found a negative association between maternal distress and intended breastfeeding duration among 852 pregnant women in Brazil.

In this current study, 95.6% mothers initiated breastfeeding. Among the mothers who initiated breastfeeding, 13.7% mothers had depressive symptoms antenatally. 10.5% mothers who had depressive symptoms at antenatal did not initiate breastfeeding. However, these were not statistically significant. There was no significant difference between breastfeeding duration and depressive symptoms during antenatal and at 1 month postpartum. Other studies reported conflicting findings in the association between depression and breastfeeding initiation and duration.

Green and Murray (1994), in their book, mentioned that women who experienced depressive symptomatology antenatally were less likely to attempt breastfeeding and those who were depressed at any time period across perinatal period were less likely to continue to breastfeed. According to Seimyr et al. (2004), among 434 Swedish women in his study, those with depressive symptomatology (EPDS≥10) antenatally were significantly less likely to initiate breastfeeding compared to those with no depressive symptoms. However, Pippins et al. (2006) reported that depressive symptoms (CES-D>10) during or before pregnancy was not associated with breastfeeding initiation in a survey of 1448 pregnant women in San Francisco. In terms of breastfeeding duration, women with persistent depressive symptoms (at 2 time points) were more likely to have breastfeeding duration less than 1 month whereas depressive symptoms at a single time point were not associated with breastfeeding duration of less than 1 month.

A study on 780 mothers in Alberta showed that depression (EPDS≥13) during pregnancy was one of the significant risk factors for early breastfeeding cessation but not at the multivariate level (Kehler et al., 2009). In a longitudinal cohort study of 365 women in Sydney, Cooke et al. (2007) did not find any relationship between maternal psychological distress (EPDS>12) and early breastfeeding cessation. However, women who stopped breastfeeding in the first 3 months after birth are also almost four times more likely to be experiencing psychological distress.

The findings in this current study confirmed the study of Bogen et al. (2010) which found that neither major depressive symptoms (SCI for DSM-IV) nor depressive

symptoms severity during pregnancy or early postpartum were associated with breastfeeding status at 2 or 12 weeks postpartum in a study of 168 women in Pittsburgh. Similar to this current study, although Bogen et al. (2010) did find univariate associations, they did not find any associations in the multivariate model after controlling for covariates. Similarly, in a study of 2 independent postpartum community sample in Oxford (n=483) and Cambridge (n=693), Cooper et al. (1993) reported that, in contrast to postpartum depression, antenatal depression (EPDS≥13) had no bearing on breastfeeding outcomes. McCarter-Spaulding and Horowitz (2007b) argued that, if maternal characteristics were associated with high motivation to breastfeed and commitment to continue breastfeeding, then such traits might have been more powerful influences than the presence of depressive symptoms.

5.6 Effects of postpartum depression on breastfeeding duration

The Cox Proportional Hazards Regression Analysis was applied to test for the effect of postpartum depression on 'full breastfeeding' and 'any breastfeeding' duration. In this study, postpartum depression has no significant association with 'full breastfeeding' duration. The Edinburgh Postpartum Depression Scale (EPDS) is a screening tool and not a diagnostic instrument. The levels of depressive symptoms among mothers in this study were not strong enough to give effects which are statistically significant. However, it was found that more mothers who were formula feeding had an increase in their EPDS scores from 1 month to 6 months compared to the mothers who were on 'full breastfeeding' and this is statistically significant (p=0.003). Other reasons may include the lack of an affordable alternative to breastmilk, the fact that breastfeeding is the cultural norm and the amount of social support available to mothers in this society.

This result compare favourably with some previous studies which found no relationship between postpartum depression and breastfeeding (Kendell et al., 1981, Cox et al., 1982, Ramsay et al., 2002, O'Neill et al., 1990, Josefsson et al., 2002, Lau and Chan, 2007, McKee et al., 2004b, Bogen et al., 2010, Kara et al., 2008, O'Brien et al., 2008, Hellin and Waller, 1992b, McCoy et al., 2008).

The findings in this study corroborate the findings of others which found no relationship between maternal depressive symptoms and breastfeeding practices. In

a longitudinal study of 174 low-income women in the United States, no relationship was found between breastfeeding practices (partial or exclusive) and maternal depressive symptoms. In other words, maternal depressive symptoms did not predict breastfeeding discontinuation (McKee et al., 2004a). It has been reported in a study of 122 depressed women in North-eastern United States that severity of depression was not significantly related to breastfeeding but other factors, older maternal age, living with a partner and higher income were positively related to breastfeeding (McCarter-Spaulding and Horowitz, 2007b).

According to Dennis and McQueen (2007) who also found no relationship between infant feeding outcomes at 1 week after delivery and the development of depressive symptomatology, immediate postpartum depressive symptoms can lead to early interruption of breastfeeding due to feelings of low self-esteem and self-confidence which can generate an exaggerated perception of the mothers difficulties in breastfeeding. They conducted a study on 594 Canadian to examine if maternal depressive symptoms influence infant feeding outcome. Similarly, O'Brien et al. (2008) found no statistical relationship between depression [Depression, Anxiety and Stress Scale (DASS)] and breastfeeding duration in her study of 375 women in Queensland, Australia.

In Hong Kong, a cross-sectional study on 1200 women showed that early postpartum depressive symptom (EPDS>9) was not associated with infant-feeding method (Lau and Chan, 2007). In another study on 409 Canadian women, maternal depression (EPDS≥12) did not affect feeding practices upon which the authors commented that the importance of maternal postpartum depression in association with infant feeding may be less than previously assumed (Ramsay et al., 2002). Josefsson et al. (2002) conducted a case-control study on 132 Swedish women and 264 controls which data were collected from medical records found that there was no association between breastfeeding and maternal depressive symptoms (EPDS≥10).

Several studies also reported that postpartum depression had negative associations with breastfeeding outcomes. In a prospective cohort study in Brazil (n=429) it was reported that children of mothers with postpartum depression (EPDS≥12) were at higher risk of early interruption of exclusive breastfeeding in the first and second month of life (Hasselmann et al., 2008). A study among 416 Norwegian found that women who were not breastfeeding were significantly more depressed than

breastfeeding women (AOR 12.4, 1.7-89.7). However, this association was not strong due to the large confidence interval. (Eberhard-Gran et al., 2002). Forster et al. (2006) also found that older maternal age was positively associated with any breastfeeding at 6 months in her study of 889 Australian other than the finding that having self-reported depression within six months after birth was negatively associated with feeding any breastmilk at 6 months.

McCoy et al. (2006) reported that in her study in Oklahoma in 2001-2003 with small sample size (n=209), there was a link between breastfeeding and postpartum depression in the sense that 'not breastfeeding' was a risk factor for postpartum depression. However, in her other study in 2003-2004 (McCoy et al., 2008) within the same community and diagnostic tool (EPDS≥13) but with a sample size of 588 (which was twice as large as the previous one and much more representative of the general population), there was no association between postpartum depression and breastfeeding.

In a cohort of 377 women in Portland, United Sates, there was an inverse relationship between depressive symptoms and breastfeeding at 6 weeks but not at 12 weeks upon which the authors came up with 2 conclusions (Hatton et al., 2005). Firstly, the inverse relationship between depressive symptoms and breastfeeding is stronger earlier in the postpartum period than later due to the fact that postpartum depression may interfere with milk production or let down. Secondly, in studies that did not find an inverse relationship between breastfeeding and maternal depression data were either obtained later in the postpartum period or were collapsed across the entire measurement period.

However, the conclusions of Hatton's study was not supported by Fleming et al. (1988) who found that depressed mood (BDI, Carroll Depression Scale) at 3 months postpartum was associated with a significant reduction in breastfeeding but there was no difference when mood was measured at 3 days or at 1 month in a longitudinal study of 56 women in Toronto, Canada. They found that depression, both in pregnancy and postpartum was associated with lower feelings of maternal adequacy at all times points. It was concluded that depressed mood, even of a mild nature, in a group of economically advantaged mothers is associated with less positive feelings of maternal adequacy and attitudes to caretaking and possible less optimal mothering behaviour.

A qualitative systematic review on the relationship between infant-feeding outcomes and postpartum depression reported that of the 49 included studies, 6 (12.2%) reported no relationship between these variables, 7 studies found an association between bottle-feeding and higher levels of depressive symptomatology and 7 other studies that reported breastfeeding was associated with lower levels of depressive symptomatology. 12 other studies suggested that mothers with depressive symptomatology were significantly more likely to discontinue breastfeeding earlier than non-depressed mothers (Dennis and McQueen, 2009).

The results of other studies on the relationship between postpartum depression and infant feeding outcomes are presented in Table 2.8 in Chapter Two.

5.7 Other factors associated with breastfeeding

5.7.1 Breastfeeding experiences

The bivariate analysis showed that 'feel guilty for not breastfeeding longer' was significantly different (p=0.023) between the mothers with depressive symptoms and mothers without depressive symptoms. Among the mothers who answered 'yes' to this question, 25% was mothers with depressive symptoms compared to a smaller percentage of mothers without depressive symptoms (9.7%) who answered 'no' to this question. This shows that their perceptions of their inability to breastfeed longer did have some influence on mothers' moods. It had been reviewed that some mothers felt disappointed for making decision to wean because of their depression (Zauderer and Galea, 2010). Both this current study and that review suggest the association between breastfeeding and postpartum depression which is: not breastfeeding can cause depression which can subsequently result in the mother not being able to breastfeed.

At 3 and 6 months postpartum, 'breastmilk enough for baby' was statistically significantly different between the mothers with depressive symptoms and mothers without depressive symptoms. At 3 months, 61.1% of the mothers without depressive symptoms agreed that their breastmilk was enough while only 39.6% of mothers with depressive symptoms agreed that their breastmilk was enough. This variable was highly significant ($p<0.001$) at both the 3 months and 6 months visits.

In this current study, other variables which were statistically significant at both 3 months and 6 months visits were 'confidence in breastfeeding' and 'satisfaction with breastfeeding experience'. These findings showed that mothers with depressive symptoms in this study may have some doubts on their faith in breastmilk, felt less confident to breastfeed and less satisfaction with their breastfeeding experience. In a study of 594 Canadian, Dennis and McQueen (2007) reported that mothers with EPDS>12 were significantly more likely to be unsatisfied with their infant feeding method and have lower breastfeeding self-efficacy (breastfeeding confidence). She also mentioned that mothers with depressive symptomatology may perceive her infants to be unsettled following a breastfeeding session leading to thoughts of insufficient milk and the need for supplementation which is a known predictor for breastfeeding duration. It had also been reported that 'faith in breastmilk' was a unique predictor of breastfeeding duration (O'Brien et al., 2008). Haku (2007) mentioned in his review that mothers with postpartum depression who cannot continue breastfeeding due to the difficult situation of breastfeeding build up anxiety which leads to worsening of postpartum depression.

5.7.2 Predictors of 'full breastfeeding duration'

After controlling for antenatal depression and postpartum depression, factors which were found to be statistically significant with the duration of 'full breastfeeding' were 'mothers' employment status' (Adjusted Hazard Ratio 0.748, 95%CI 0.602-0.930), 'husband helps in taking care of baby' (1.972, 1.157-3.361), 'intention to breastfeed' (1.669, 1.187-2.345) and 'attended breastfeeding classes' (0.806, 0.675-0.962).

In the model which analysed the association of antenatal depression and 'full breastfeeding' duration, factors which appeared to be associated (statistically significant) with 'full breastfeeding' duration were 'mother's employment status' (Adjusted Hazard Ratio=0.760, CI=0.621-0.931), 'husband helps take care of baby' (1.867, 1.176-2.966), 'method of delivery' (0.748, 0.575-0.974), 'intention to breastfeed' (1.556, 1.114-2.174) and 'breastfeeding classes' (0.806, 0.682-0.952). These factors are predictors of 'full breastfeeding duration' in this study.

Mother's Employment status

The theory that unemployed mothers have longer breastfeeding duration is further strengthened by the finding in this current study. Mothers who were unemployed were at higher odds for 'full breastfeeding' duration. According to El-Gilany et al. (2011), being a housewife was the strongest independent predictor of exclusive breastfeeding in a cross-sectional study of 1904 mothers in Saudi Arabia. In another study of 906 women in Birmingham, England, the strongest independent predictor of early breastfeeding cessation was return to work within three months of giving birth (Bick et al., 1998). Chuang et al. (2010) also found that mother's employment status was a barrier to the continuation of breastfeeding among 20172 Taiwanese women in her study.

Method of delivery

In this study, method of delivery was significantly associated with 'full breastfeeding' duration. Women who had vaginal delivery were more likely to practice full breastfeeding compared to those who had caesarean section. Similar finding was reported by other studies. In a study of 1520 mothers in China, Qiu et al. (2009) reported that exclusive breastfeeding was positively related to vaginal birth.

One recent study on 1904 Arab women reported that operative delivery adversely affects the adoption of exclusive breastfeeding in comparison with spontaneous vaginal delivery (El-Gilany et al., 2011).

Breastfeeding Education Classes

A surprising finding in this study is that mothers who did not attend breastfeeding classes had longer full breastfeeding duration than those who did. Conversely, in a study of 1163 women in the United States, insufficient prenatal breastfeeding education have been associated with breastfeeding discontinuation (Taveras et al., 2003). In another study, not attending childbirth training sessions was one of the factors that was negatively associated with any breastfeeding among 889 Australian (Forster et al., 2006). However, in another study of 150 women in Chicago, Schy et al. (1996) found no relationship between in-hospital lactation education and duration of lactation. Participation in a lactation-education session did not increase breastfeeding duration. Interestingly, Mohammad et al. (2010) found that maternal

knowledge during pregnancy on labour, infant care and parental role was associated with the development of antenatal and postpartum depression in a study of 353 Jordanian.

In Malaysia, every mother who attended the Maternal and Child Health Clinics are required to attend the breastfeeding education classes for every pregnancy which would usually be abided by first time mothers. Therefore, in this study, mothers who attended the breastfeeding education classes could probably be first time mothers who have been reported in other studies (Lee et al., 2007b, Piper and Parks, 1996) to be associated with shorter breastfeeding duration.

The finding of this current study is comparable to the finding of Foo et al. (2005)on 2098 mothers in Singapore who found that mothers who did not receive advice from health professionals during pregnancy were more likely to breastfeed for a longer duration. They reported that the primary sources of information were family members, friends and books.

Therefore, the finding of this current study and that of Foo's suggested that it is important to provide pregnant mothers with credible source of information as early as possible during pregnancy to influence mother's infant feeding decision.

Social support for breastfeeding

'Husband helps in taking care of the baby' appeared to be a significant predictor for longer breastfeeding duration in both models. Another way to look at this finding is that mothers who received help or good social support has longer breastfeeding duration. This could mean that mothers who received enough help in taking care of the baby and other children or with other household chores have more time to establish longer breastfeeding duration.

Taveras et al. (2003) study on 1163 mothers in a health maintenance organisation in California reported that mothers who lack of support from the father of the infant for breastfeeding were more likely to discontinue breastfeeding at 2 weeks. However, regular childcare support from other female relative has been found to be a predictor for early breastfeeding cessation (Bick et al., 1998). This study examined the factors which influences the uptake and cessation of breastfeeding in a group of 906

mothers in Birmingham, England. It is being argued that negative advice based on relatives' own experiences is likely. This is supported by the findings of Haku (2007) who reviewed the factors associated with the continuation of breastfeeding in Japan. She found that a restrictive factor which was particularly characteristic to the Japanese culture was negative influences from family members or others. It was found that a home visit after childbirth and family support could interfere with the mother's motivation to breastfeed.

5.7.3 Predictor for 'any breastfeeding' duration

From the Cox Proportional Hazard Model, after controlling for antenatal depression, the only significant factor for 'any breastfeeding' duration was the 'intention to breastfeed' (1.859, 1.151-3.001). Additionally, after controlling for both antenatal depression and postpartum depression, 'intention to breastfeed' (1.985, 1.220-3.231) is still the only factor which was significantly associated with 'any breastfeeding' duration in this study.

Intention to breastfeed

It had been reported in many studies that women's infant feeding intention is a strong predictor for infant feeding status (Scott and Binns, 1999, Bogen et al., 2010, Donath and Amir, 2003). Intention to exclusively breastfeed was the most significant predictor of breastfeeding initiation and duration (Bogen et al., 2010). Women who intended to exclusively breastfeed were more certain of their feeding decision, more determined to succeed at breastfeeding and more confident that they would be able to succeed successfully (Bogen et al., 2010).

In this current study, 'intention to breastfeed' was also a significant predictor of the duration of 'full breastfeeding'. Numerous studies found that intentions before the childbirth are closely linked to mothers' actual feeding practices (Atchan et al., 2011, Lau, 2002, Chezem et al., 1997, Bogen et al., 2010, Fairlie et al., 2009). Fairlie et al. (2009) found that prenatal intention to breastfeed predicted initiation in her study of 1436 women in the United States.

Breastfeeding intention was a strong predictor of actual breastfeeding in a study of 174 African-American and Hispanic women (McKee et al., 2004b) and prenatal intention to breastfeed had an influence on both initiation and duration of

breastfeeding (Donath and Amir, 2003, Bogen et al., 2010). In a large population based study of 10548 women in Avon, United Kingdom, intended breastfeeding duration correctly predicted 91.4% of breastfeeding initiation and 72.2% of infant feeding at 6 months (Donath and Amir, 2003). Bogen et al. (2010) also found that intention to exclusively breastfeed as reported in pregnancy was the best predictor of breastfeeding status at 2 and 12 weeks postpartum in a sample of 168 women in Pittsburgh.

Prenatal intention to breastfeed, attitudes towards breastfeeding, maternal confidence, supports from healthcare providers and family and friends can positively or negatively influence breastfeeding decisions (Binns and Scott, 2002, Dennis, 2002). Other independent predictors of early breastfeeding discontinuation were breastfeeding problems at 2 to 3 days and lack of confidence in the ability to breastfeed (Taveras et al., 2003). In some, the most common reasons among the 226 early stoppers were related to physical problems with lactation (Bick et al., 1998). Forster et al. (2006) found that a very strong desire to breastfeed was positively associated with any breastfeeding at 6 months. Duration of breastfeeding was most strongly associated to the length of time a mother intended to breastfeed (Scott et al., 2001). Intention to breastfeed, which is linked to strongly held cultural beliefs is somewhat difficult to alter (Caulfield et al., 1998, Kessler et al., 1995).

5.8 Effects of cultural/traditional beliefs and practices on postpartum depression

In this study, it was found that traditional and cultural factors which were associated with postpartum depression in this study were ‘having food taboos during confinement’ (p=0.035), ‘confined in the house only’ (p=0.016), ‘mothers perceptions about the confinement practices’ (p=0.010) and ‘if the practices help them regain health’ (p=0.027).

Similarly, Kadir et al. (2006) found that use of traditional medication and traditional massages were significantly associated with postpartum depression among 377 women in Peninsular Malaysia. Traditional medicine appeared to be the strongest predictor associated with postpartum depression in that study. A cross-sectional correlational study of 154 Malaysian women suggested that respondents who practiced postpartum rituals actually had higher scores than those who did not (Grace et al., 2001). The author argued that it could probably be that the traditional

practices increases depression or depressed women make more use of traditional medicine. It could be that these women were trying to find a cure for their depression.

The finding of this current study confirmed the findings of the two previous studies on postpartum rituals practices in Malaysia (Kadir et al., 2006, Grace et al., 2001) that these practices place the postpartum mothers at an increased risk of developing postpartum depression. However, the causal relationship is still unclear. It could be that depressed mothers adhered to these rituals to reduce their unstable emotional conditions. Further investigation is warranted for a plausible explanation of this association.

Grigoriadis et al. (2009) argued in his review of 12 studies that it is unclear whether the findings of his review indicated that practicing postpartum rituals directly or indirectly result in an increase in postpartum depression. It may be that women who are depressed are more likely to practice rituals, take traditional medicine or follow special diet in an attempt to treat their symptoms. It was suggested that postpartum rituals in Japan, Vietnam, Malaysia, Hong Kong and Singapore did not provide significant psychological benefits for the new mothers (Klainin and Arthur, 2009).

In a study of 559 women in Singapore, Chee et al. (2005) reported that mothers who regard their confinement experience as a negative one were at increased risk of developing depressive disorder. However, a positive confinement experience was not associated with lower risk of developing depressive disorder either. One important highlight in this study is that culturally mandated social support is a complex phenomenon which cannot be assumed to be always helpful to the mother.

While Nahas and Amasheh (1999) and Dankner et al. (2000) reported that traditions and customs and a positive maternal role may have a protective effect against postpartum depression, Yoshida et al. (2001) found that the traditional support system of the Japanese *Satogeri Bunben* did not lower the prevalence of postpartum depression (EPDS>9) in his cross-sectional comparative study of Japanese mothers in Japan (n=88) and England (n=98).

The effect of culture on postpartum depression is more prominent among immigrants. Among 45 middle-eastern women living in Sydney, Australia who were diagnosed with postpartum depression, transition to a new country places enormous

stress in family life and childbirth and when family and kinship support were lacking, they needed other forms of support from nurses and midwives (Nahas and Amasheh, 1999).

Dankner et al. (2000) who investigated the social, cultural and religious factors underlying postpartum depression in 327 Jewish Jerusalem women reported that greater religiosity was associated with decreased risk of depressive symptoms than the secular, traditional and orthodox group. Secular women demonstrated the highest risk and could be due to the lack of protective cultural patterns within their communities.

In this current study, majority of the respondents were from the lower socioeconomic status with low education level and household income, mostly housewife and there is a possibility that they are also religious. This could be a plausible explanation for the low prevalence of postpartum depression in this community.

Beeghly et al. (2002) measured the changes of depressive symptomatology during the first postpartum year in a community cohort of 106 first time mothers in Harvard, United States. They reported that the highest level of depressive scores occurred at 2 months postpartum compared to the scores at 3, 6 and 12 months. Furthermore, mothers with high levels of depressive symptomatology at 2 months postpartum (especially those with diagnosed depression) are at increased risk of continuing to experience high levels of depressive symptomatology throughout the first postpartum year.

To some mothers, 2 months postpartum is the time when mothers are dealing with returning to work, family support systems are leaving and the honeymoon period after the birth is finished (Groer, 2005a). In Malaysia, it is only recently that the maternity leave is being extended up to 3 months after childbirth. These two arguments by Beeghly et al. (2002) and Groer (2005a) suggested that continuous support for the mother should be provided as long as needed particularly among mothers who experience other risk factors mentioned in the literature. The findings in this current study showed that there are many risk factors which are operating in this cohort of women.

CHAPTER 6: CONCLUSION & RECOMMENDATIONS

Overview

A summary of the key findings of the study are presented in this chapter. Issues on breastfeeding and postpartum depression and associated factors are summarized. Based on the results of the study, recommendations and suggestions for future studies are provided.

6.1: Summary

Overall, 2072 mothers participated in the antenatal, 1598 in one month postpartum, 1326 in three months and 1184 in the six months postpartum interviews. A total of 942 mothers attended all the four interviews. The main distinction in this study was between prenatal and postnatal depression. Together these constitute perinatal depression. In our study we did not discuss minor and major depression as these terms are not commonly used in Australia or Malaysia.

6.1.1 Factors associated with breastfeeding

The rate of breastfeeding initiation was 95.6% in this current study. In terms of breastfeeding duration, 95.9%, 88.2% and 80.7% were breastfeeding and 67.2%, 49.8% and 36.1% mothers were 'fully breastfeeding' at 1 month, 3 months and 6 months respectively. Prelacteal feeds were given by 4.4% of mothers. Factors which were statistically significantly associated with giving a prelacteal feed included the mother's age, religion and education level.

The mean scores for the IOWA Infant Feeding Attitude Scale were 57.3±8.1 at antenatal, 57.0±7.8 at 3 months and 57.0±7.6 at 6 months. There was a significant correlation between IIFAS scores and duration of 'full breastfeeding' but there was no correlation with 'any breastfeeding' duration.

The predictors of 'full breastfeeding duration' in this study include 'mother's employment status' (p=0.008, Adjusted Hazard Ratio=0.760, CI=0.621-0.931), 'husband helps take care of baby' (p=0.008, 1.867, 1.176-2.966), 'method of delivery' (p=0.031, 0.748, 0.575-0.974), 'intention to breastfeed' (p=0.010, 1.556, 1.114-2.174) and 'attended breastfeeding classes' (p=0.011, 0.806, 0.682-0.952). 'Intention to breastfeed' (p=0.006, 1.985, 1.220-3.231) is the only factor which was significantly associated with 'any breastfeeding' duration in this study.

For 'any breastfeeding' duration, 96.3%, 87.2% and 78.9% mothers without depressive symptoms were breastfeeding at 1 month, 3 months and 6 months respectively. Among the mothers without depressive symptoms, 94.1%, 83.7% and 72% mothers were practicing 'any breastfeeding at 1 month, 3 months and 6 months respectively. Intention to breastfeed was significantly different between mothers with and without depressive symptoms. During pregnancy, 63.7% mothers without depressive symptoms intended to fully breastfeed compared to 54.3% mothers with depressive symptoms. For length of 'intention to breastfeed', 25.1% mothers with depressive symptoms intended to breastfeed for less than 6 months compared to 13.8% mothers without depressive symptoms who intended to do so. However, intended length of breastfeeding was not associated with depressive symptoms in the postpartum period.

6.1.2 Factors associated with antenatal depression

The prevalence of antenatal depression in this study was 13.8% (n=285). Risk factors for antenatal depression include 'family household income' (AOR=0.649, 95%CI=0.434-0.971), 'on family planning' (1.714, 1.241-2.369), 'unhappy with the pregnancy' (0.403, 0.191-0.850), 'unplanned pregnancy' (0.464, 0.340-0.634) and 'worry during pregnancy' (3.043, 2.244-4.126). Mothers from the lowest income group had the highest odds of developing antenatal depression. Mothers who were on family planning, unhappy with the pregnancy, have an unplanned pregnancy and worry during pregnancy were at risk in developing postpartum depression.

6.1.3 Factors associated with postpartum depression

The prevalence of postpartum depression in this study was 7.6% (120 mothers) at 1 month, 7.2% (94 mothers) at 3 months and 8.0% (93 mothers) at 6 months. Among the 942 mothers who attended all the 4 interviews, 25.5% of the mothers had EPDS scores indicating that they had been depressed on at least one occasion.

Ten risk factors associated with postpartum depression included 'generally consider yourself a worrier' (1.859, 1.039-3.328), 'husband helps take care of baby' (0.208, 0.070-0.621), 'relationship with husband' (0.079, 0.007-0.862), 'happy with relationship with husband' (0.103, 0.019-0.551), 'maternity blues' (3.227, 1.823-5.712), 'have emotional problem during the last pregnancy' (1.978,1.089-3.590), 'food taboos during confinement' (1.976,1.164-3.355), 'previous depression' (1.982,1.174-3.344), 'have problems most of the time' (0.325, 0.202-0.522) and 'problems with childcare during confinement' (0.604, 0.384-0.949). These factors are similar to the following factors reported in the literature: previous depression, prenatal anxiety/depression, self-esteem, social support, childcare stress, socio-economic status, marital satisfaction, life stress, maternity blues and traditional practices.

In this study the traditional and cultural factors which were associated with postpartum depression were 'having food taboos during confinement' (1.976, 1.164-3.355), 'being confined in the house only' ($p<0.05$) and 'mothers perceptions about the confinement practices' ($p<0.05$). All other cultural factors measured were not associated with the development of postpartum depression.

The Generalized Estimated Equation (GEE) model showed that duration of 'full breastfeeding' was not statistically significantly associated with postpartum depression. Risk factors for postpartum depression in this model include 'family household income', 'husband help in taking care of baby', 'having problems most of the time' and 'antenatal depression'. The GEE model also showed that the duration of 'any breastfeeding' was not statistically significantly associated with postpartum depression. Risk factors for postpartum depression in this model include 'husband help in taking care of baby', 'problems with childcare during confinement', 'having problems most of the time' and 'antenatal depression'. Factors which appeared to

be consistent in both GEE models were ‘husband helps in taking care of baby’, ‘having problems most of the time’ and ‘antenatal depression’.

In the Cox regression model examining the association between postpartum depression and ‘full breastfeeding’ duration, postpartum depression showed no significant association with ‘full breastfeeding’ duration. Four factors which had a significant association as predictors for ‘full breastfeeding’ duration were ‘mother’s employment status’, ‘husband’s help in taking care of baby’, ‘intention to breastfeed’ and ‘did not attend breastfeeding classes’. In another Cox regression model examining the association between postpartum depression and ‘any breastfeeding’ duration, postpartum depression has no significant effect on ‘any breastfeeding’ duration. ‘Intention to breastfeed’ was the only significant predictor for ‘any breastfeeding’ duration.

There was no association between antenatal and postpartum depression with breastfeeding and neither was there any effect of breastfeeding on the development of postpartum depression. Explanations for this lack of association between breastfeeding and depression could be that depressive symptoms of the mothers in this study were at a mild degree. The Edinburgh Postpartum Depression Scale (EPDS) is a screening tool and not a diagnostic instrument. The levels of depressive symptoms among mothers in this study were not strong enough to give effects which are statistically significant. However, it was found that more mothers who were formula feeding had an increase in their EPDS scores from 1 month to 6 months compared to the mothers who were on ‘full breastfeeding’ and this is statistically significant ($p=0.003$). Other reasons may include the lack of an affordable alternative to breastmilk, the fact that breastfeeding is the cultural norm and the amount of social support available to mothers in this society.

6.2 CONCLUSION

In conclusion, this study provided information on antenatal and postpartum depression and breastfeeding practices in Sabah Malaysia. These results are based on interviews with mothers in the in the antepartum and postpartum periods. The results showed that there was no association between antenatal and postpartum depression on breastfeeding and neither was there any effect of breastfeeding on the development of postpartum depression. ‘Intention to breastfeed’ was a strong

predictor for ‘any breastfeeding’ and ‘full breastfeeding’ duration in this study. This finding has important implications for clinical care as it shows that mothers who develop postpartum depression are able to continue breastfeeding and this association is strengthened if they expressed an “intention to breastfeed” in the antenatal period.

Although in this study, breastfeeding initiation and duration was not a risk factor for developing postpartum depression among mothers in the Sabahan community, this study identified other risk factors which are operating in this cohort of women. This study adds to the findings of many other Asian studies which found social support and traditional postpartum experiences as risk factors for postpartum depression. Although this study found no association between antenatal and postpartum depression with breastfeeding, extra care should be considered among mothers who experienced these risk factors to protect them from the consequences of depression and to achieve breastfeeding goals.

6.3 RECOMMENDATIONS

- Further studies need to be conducted in Sabah to confirm the findings as this is the first such study in Sabah.

- Majority of the mothers involved in this study were from low income sections of the community. Further studies need to be conducted in private clinics which cater for mothers from higher income families. This will provide additional information for developing community programs.

- Antenatal depression should be assessed on more than one occasion during the antenatal and postpartum periods, to enable early intervention and prevention of the development of depression in the postpartum period

- Postpartum depression should also be assessed early in the postpartum period, perhaps within the first week of delivery to enable appropriate measures that could be taken to avoid interference with breastfeeding practices.

- Prelacteal feeds should be discussed and discouraged in antenatal education. In future studies prelacteal feeds should be assessed earlier in the postpartum period to avoid recall bias.

- Although the Edinburgh Postpartum Depression Scale is a useful screening tool, more diagnostic tools should be incorporated in future studies to help determine the optimal screening tool for depression in Malaysia.

- It is suggested that screening and treatment should be targeted on women with high risk factors as early as possible during pregnancy to reduce the severity of postpartum depression.

- Women should be helped to meet their breastfeeding goals as this may also help in decreasing postpartum depression and thereby improving health outcomes by two generations.

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APPENDIX A: ETHICS APPROVAL LETTER

Curtin University of Technology

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Human Research Ethics Committee

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memorandum

To	Prof Colin Binns, Public Health
From	A/Professor Stephan Millett, Chair, Human Research Ethics Committee
Subject	Protocol Approval **HR 169/2008**
Date	16 March 2009
Copy	Aza Sherin Mohamad Yusuff, Public Health Graduate Studies Officer, Faculty of Health Sciences

Thank you for providing the additional information for the project titled "*Breastfeeding and Postnatal depression in Sabah, Malaysia*". The information you have provided has satisfactorily addressed the queries raised by the Committee. Your application is now **approved**.

- You are authorised to commence your research as stated in your proposal.
- The approval number for your project is **HR 169/2008.** *Please quote this number in any future correspondence.*
- Approval of this project is for a period of twelve months **28-02-09** to **28-02-10**. To renew this approval a completed Form B (attached) must be submitted before the expiry date **28-02-10**.
- If you are a Higher Degree by Research student, data collection must not begin before your Application for Candidacy is approved by your Divisional Graduate Studies Committee.
- The following standard statement **must be** included in the information sheet to participants:

  This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 169/2008). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Applicants should note the following:

It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

The attached **FORM B** should be completed and returned to the Secretary, HREC, C/- Office of Research & Development:
When the project has finished, or

- If at any time during the twelve months changes/amendments occur, or
- If a serious or unexpected adverse event occurs, or
- 14 days prior to the expiry date if renewal is required.
- An application for renewal may be made with a Form B three years running, after which a new application form (Form A), providing comprehensive details, must be submitted.

Regards,

A/Professor Stephan Millett
Chair Human Research Ethics Committee

APPENDIX B: INFORMATION SHEET AND CONSENT FORM

Information Sheet for Respondents

Dear Madam,

My name is Aza Sherin Mohamad Yusuff. I am a lecturer at the School of Medicine, University Malaysia Sabah and currently studying for my PhD at Curtin University of Technology, Perth, Australia. I am conducting research into breastfeeding and mother's health in Sabah, Malaysia. It will help us to understand more of the breastfeeding practices and the problems experienced by mothers after birth among Sabahans. This research has been approved by the Human Research Ethics Committee, Curtin University of Technology, Sabah State Health Department and the Clinics administrators.

I am asking for your help by participating in this study. You can help by completing four questionnaires at 36 weeks (now), at 1 month, 3 months and 6 months postpartum. An interviewer will be available to help you should there be any problem in answering the questions. If the research team become aware of anything which makes them think you may need some help, we will tell the appropriate person/s who will be able to help you.

All information given is for study purposes only and will be kept completely confidential. All data will be analysed and reported in groups for the purpose of this study only.

You will need to fill in and sign the consent form if you agree to participate. A copy of the form will be given to you for you to keep. You may withdraw at any time of the interview or any duration of the study. We respect your decision if you wish NOT to participate.

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 169/2008). If needed, verification of approval can be obtained either by writing to the Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

If you have any concern or questions about this study, please contact me at 019-8954809 or email me at azasherin.mohamadyusuff@postgrad.curtin.edu.au. You can also contact my supervisor as follows:

Professor Colin Binns
Professor of Public Health
Curtin University of Technology
GPO Box U1987
Perth, Western Australia 6845
Australia
Tel no: +61 8 9266 2952

Thank you very much for your co-operation.

Yours sincerely,

AZA SHERIN MOHAMAD YUSUFF

CONSENT FORM

UNIVERSITY OF MALAYSIA SABAH

CURTIN UNIVERSITY OF TECHNOLOGY, PERTH, AUSTRALIA

STUDY ON BREASTFEEDING AND POSTPARTUM DEPRESSION

The University of Malaysia Sabah and the School of Public Health at Curtin University are studying how babies are fed and the risk factors for postpartum depression. As part of this project, mothers in 3 Maternal and Child Health Clinics in Kota Kinabalu, Luyang and Penampang are being asked about their experiences and opinions. Initially as a mother you will be asked to complete some questionnaires at the 36 weeks of gestation visit to the clinic and at 1 month, 3 months and 6 months postpartum visits to the clinics. You will be given the same or different questionnaires on each visit. The research will provide important information to improve the quality of child health care in Malaysia. All information given will be kept confidential. If you are able to help us with our research, please sign the consent form below and provide us with your name, address and telephone number.

Thank you in anticipation of your assistance.

Yours sincerely

Aza Sherin Mohamad Yusuff
PhD Candidate
School of Public Health
Curtin University of Technology
GPO Box U1987
Perth WA 6845
Tel: 9266-4341
Fax: 9266-2958

January 2009

Colin Binns
Professor of Public Health
Curtin University of Technology
GPO Box U1987
Perth WA 6845
Tel: 9266-4341 or 0401 103 639
Fax: 9266-2958

January 2009

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Curtin University Breastfeeding and Postpartum Depression Study - Consent Form

I agree to participate in the study of Breastfeeding and Postpartum Depression. I understand that my participation is completely voluntary and I may withdraw from the study at any time. I understand that my participation will be limited to completing a few questionnaires during my baby's first year of life. I understand that all interviewers working on the study are qualified health professionals and that all individual data will be kept strictly confidential.

_____ _____
Signature Date

_____ _____
Name (please print) Telephone number

_____
Address

APPENDIX C: QUESTIONNAIRE 1 (Antenatal)

Curtin University of Technology

Breastfeeding and Postpartum Depression Study

2009

Interview Date: _____/___/_____ Interviewer Code:_____

Mother's name: _____

ID Number _____Ethnic group _____

Tel: (home) _____ (mobile)_____

Address: _____

Maternal and Child Health Clinics:

Kota Kinabalu……..……..…1 Luyang…… 4
Putatan…….. 2 Inanam……..……5
Penampang …… 3

A. BREASTFEEDING INFORMATION

1. How are you going to feed your baby?

breastfeeding only ..... ……...1
bottle-feeding only 2
mainly bottle-feeding (formula) but also breastfeeding 3
mainly breastfeeding but 'topping up' with bottle-feeding (formula) 4
other (please specify)_____

2. When did you **first** decide how you were going to feed your new baby?

before I became pregnant 1
early in my pregnancy 2
late in my pregnancy 3
during labour…… 4
after my baby was born 5

3. Does the baby's father have any preference for how you will feed your baby?

yes, he prefers bottle-feeding 1
yes, he prefers breastfeeding 2
he doesn't mind how I feed my baby 3

4. When do you plan to first give your baby solids?

before 2 months 1
between 2 and 3 months 2
between 4 and 6 months 3
between 7 and 9 months 4
over 12 months 6
when baby is ready 7
I don't know 8

other (please specify)_____.

5. If you plan to breastfeed, at what age do you plan to stop breastfeeding your baby?

before baby is 6 weeks old..... 1
between 6 weeks and 2 months..... 2
between 2 and 3 months..... 3
between 4 and 6 months..... 4
between 7 and 9 months..... 5
between 10 and 12 months……..6
over 12 months 7
other (please specify) _____

7. Since you have been in hospital have you received any of the following from hospital staff?

(Please circle **all** that you have received. You can have more than one answer)

a. pamphlets or booklets on **breastfeeding** your baby……..……1
b. lectures or classes on **breastfeeding** your baby..... 2
c**.** demonstrations on how to **breastfeed** your baby..... 3
d. video (TV) or slide show on how to **breastfeed** your baby..... 4
e. individual consultation or discussion with any of the staff about **breastfeeding** your baby 5
f. pamphlets or booklets on **bottle-feeding** your baby..... 6
g. lectures or classes on **bottle-feeding** your baby 7
h. demonstrations on how to **bottle-feed** your baby 8
i. video (TV) or slide show on how to **bottle-feed** your baby..... 9
j. individual consultation or discussion with any of the staff about **bottle-feeding** your baby…….. 10
k. pamphlets or booklets on **introducing solids** to your baby..... 11
l. classes on **introducing solids** to your baby..... 12
m. demonstrations on **introducing solids** to your baby 13
n. video (TV) or slide show on **introducing solids** to your baby..... 14
o. none of the above..... 15
other (please specify) _____

B. IOWA INFANT FEEDING ATTITUDE SCALE

For each of the following statements, please indicate how much you agree or disagree by circling the number that most closely corresponds to your opinion. The number '1' indicates strong disagreement, whereas '5' indicates strong agreement.
Example: Drinking tea is good for you. You agree with the statement but not strongly agree. Your answer is 4. Circle number 4 in the options.

		Strongly disagree				**Strongly agree**
a	The nutritional benefits of breast milk last only until the baby is weaned from breast milk	1	2	3	4	5
b	Formula-feeding is more convenient than breastfeeding	1	2	3	4	5
c	Breastfeeding increases mother-infant bonding	1	2	3	4	5
d	Breast milk is lacking in iron	1	2	3	4	5
e	Formula-fed babies are more likely to be overfed than breast-fed babies	1	2	3	4	5
f	Formula-feeding is the better choice if the mother works outside the home	1	2	3	4	5
g	Mothers who formula-feed miss one of the great joys of motherhood	1	2	3	4	5
h	Women should not breastfeed in public places such as restaurants	1	2	3	4	5
i	Babies who are fed breast milk are healthier than babies who are fed formula	1	2	3	4	5
j	Breast-fed babies are more likely to be overfed than formula-fed babies	1	2	3	4	5
k	Fathers feel left out if a mother breastfeeds	1	2	3	4	5
l	Breast milk is the ideal food for babies	1	2	3	4	5
m	Breast milk is more easily digested than formula	1	2	3	4	5
n	Formula is as healthy for an infant as breast milk	1	2	3	4	5
o	Breastfeeding is more convenient than formula-feeding	1	2	3	4	5
p	Breast milk is less expensive than formula	1	2	3	4	5
q	A mother who occasionally drinks alcohol should not breastfeed her baby	1	2	3	4	5

C. DEMOGRAPHIC INFORMATION

8. What is your age? _____ 9. What is your religion? _____

10. What is the highest level of education you have completed?
Primary school……....1
Lower Secondary School……...2
Higher Secondary School……..3
Certificate……..4
Diploma……5
Degree ……6
Other: _____7

11. How many years of schooling have you completed? _____

12. What is your occupation?
Housewife……..1
Full-time employed ……..2
Part-time employed ..……..3
Self-employed……4
Please state your occupation: _____

13. What is your marital status?
married……...1
never married……2
divorced or separated ……...…3
widowed…….. ..4

14. What is your husband's / partner's occupation?
Unemployed…….…1
Full-time employed ……..2
Part-time employed..…….3
Self-employed……...4
Please state your occupation: _____

15. What is the highest level of education your husband / partner have completed?
Primary school……..…....1
Lower Secondary School……....2
Higher Secondary School……....3
Certificate……..4
Diploma……....5
Degree ……....6
Other: _____7

16. Approximate total monthly household income
less than RM 500……....1
RM 501 to RM 1000……..…2
RM 1001 to RM 1500……...…3
RM 1501 to RM 2000……...…4
RM 2001 to RM 2500……5
RM 2501 to RM 3000……....6
more than RM 3000……..…7

D. POSTNATAL DEPRESSION INFORMATION

17. Do you have any problem / misunderstandings with the followings at the moment?(please circle all that applies)

Husband……..……...1
Children…….……....2
Mother……3
Brothers/Sisters…….…..4
In-laws…….…..…5
Neighbors…….....6
Financial problem……....7
Health Problem…….…...8
Occupational Problem…….…...9

18. How long have you been married?

< 2 years……..……1
2-5 years……..…….2
5-10 years……....3
> 10 years……..…..4

19. Type of marriage?

Monogamous……..…….…1
Polygamous……..2

20. Does your husband has other wives?

Yes……1
No……..2

21. Are you the first, second, third or fourth wife? _____

22. Are you satisfied with your marriage?

Yes……..….1
No……..…..2

23. Were you on any contraceptive pills before you were pregnant?

Yes…….1
No……..2

23a. If yes, what type? _____
what brand? _____

24. Are you happy with the pregnancy?

Yes…….1
No……...2

25. Is the pregnancy a planned one?

Yes…….1
No……..2

26. Do you have any worries during pregnancy?

Yes……..1

No……..2

26a. If yes, what? _____

27. In general, how would you describe your feelings throughout the pregnancy?

Most of the time happy…….1

Most of the time worried……..2

Most of the time sad…….3

Most of the time depressed……..…..4

Others (please specify) _____

E. EDINBURGH POSTNATAL DEPRESSION SCALE

Cross the answer which comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today.

1. I have been able to laugh and see the funny side of things.

0. As much as I always could
1. No quite so much now
2. Definitely not so much
3. Not at all

2. I have looked forward with enjoyment to things.

0. As much as I ever did
1. A little less than I used to
2. Definitely less than I used to
3. Hardly at all

3. I have blamed myself unfairly when things went wrong.

0. No, never
1. Not very often
2. Yes, some of the time
3. Yes, most of the time

4. I have been anxious or worried for no real reason.

0. No, not at all
1. Hardly ever
2. Yes, sometimes
3. Yes, very often

5. I have felt scared or panicky for no real reason.

0. No, not at all
1. Hardly ever
2. Yes, sometimes
3. Yes, very often

6. Things have been too much for me.

0. No, I have been coping as well as ever
1. No, most of the time I have coped quite well
2. Yes, sometimes I haven't coped as well as usual
3. Yes, most of the time I haven't been able to cope at all

7. I have been so unhappy that I have had trouble sleeping.

0. No, not at all
1. Not very often
2. Yes, sometimes
3. Yes, most of the time

8. I have felt sad or miserable

0. No, not at all
1. Not very often
2. Yes, quite often
3. Yes, most of the time

9. I have been so unhappy that I have cried.

0. No, never
1. Only once in a while
2. Yes, quite often
3. Yes, most of the time

10. I have thought of hurting myself.

0. Never
1. Hardly ever
2. Sometimes
3. Yes, quite often

THANK YOU VERY MUCH FOR YOUR PARTICIPATION.

Interviewers signature:_____

APPENDIX D: QUESTIONNAIRE 2 (1 MONTH POSTPARTUM)

Curtin University of Technology

Breastfeeding and Postpartum Depression Study

2009

Questionnaire 2 at 1 month postpartum

Interview Date: ___/___/___Interviewer Code:_____

Mother's name: _____ ID Number _____

Ethnic group _____ Tel: (home) _____

(mobile)_____

Address:_____

Baby's Date of Birth: ___/_____/_____ **Baby's gender?** Male 1 Female 2

A. BREASTFEEDING INFORMATION

1. How (were) you feeding your baby at discharge from hospital?

Breastfeeding only……..1
Breastfeeding + (sugar) water ……2
Breastfeeding + juice……..3
Mainly breastfeeding but "topping up" with bottle feeding……...4
Mainly bottle feeding but also breastfeeding……..…5
Bottle feeding only…….6
Other(please specify): _____

2. What was your baby's first feed after he/she was born?

Breast milk (or colostrum)……..1
Formula ……..2
Sugar water…….3
Plain water……..4
Don't know…….5
Other (please specify) _____

3. How long after birth did you first breastfeed your baby?

Less than 1 hour……..……....1
1-4 hours…….2
More than 4 hours, Less than 1 day……3
More than 1 day after birth……4
Don't Know……5

4. How are you feeding your baby now?

Breastfeeding only……..1
Breastfeeding + (sugar) water ……2
Breastfeeding + juice……..3
Mainly breastfeeding but "topping up" with bottle-feeding……..….4
Mainly bottle feeding but also breastfeeding……..…5
Bottle feeding only…….6
Other(please specify): _____

5.How many of these feeds would be breastfeeds (in 24 hours)?

_____

6. How many of these feeds would be formula feeds (in 24 hours)?

_____

7. What is the average length of each feeding episode?

Less than15 minutes……..1 Between 30 minutes and 1 hour……3

Between 15 and 30…….2 More than 1 hour……...4

FOR MOTHERS WHO ARE FORMULA FEEDING THEIR INFANT.

8. Did you try to breastfeed your baby?

Yes……..…1

No……..2

9. Why did you change to bottle feeding?

_____

10. Why did you feed your baby formula?

It is better than cow milk…….……..1

It is as good as better than breast milk…….….2

Hospital staff told me to …….…….….3

Mother has problem breastfeeding (describe): _____

Other: _____

11. Which formula are you using?

Domestic milk formula…….1

Imported milk formula…….…….2

Other _____3

12. How many times a day is your baby fed formula? _____

13. When did you first decide how to feed your new baby?

After my baby was born……....1

Before I became pregnant…….2

Early in my pregnancy…….....3

Late in my pregnancy……....4

Other: _____

14. Who helped you decide whether you would bottle-feed or breastfeed?

(Please circle any answers that apply)(You can have more than one answer)

No one……..……1

The baby's father …….....…1

My mother…….....1

Doctor ……..……..…..1

Other (please specify): _____..1

15. What were the reasons for your choice of bottle-feed?
(You can have more than one answer)

Bottle feeding is as good as breastfeeding……1
Bottle-feed is easier……2
I will go back to work……3
Breastfeeding will make my breasts sag……....4
The baby's father prefers bottle-feeding……5
My mother suggested bottle-feed…….....6
My health problem: _____
Other: _____

FOR ALL MOTHERS

16. How many times do you feed during the day (6.0am to 9.0pm)? _____
How many times do you feed during the night (9.0pm to 6.0am)? _____

17. Did your mother breastfeed any of her children for more than 1 month?

Yes……1
No…….....0
Don't know……...2

18. Does your mother have any preference for how you feed your baby?

Yes, she prefers bottle-feeding…….. 1
Yes, she prefers breastfeeding ……. 2
She doesn't mind how I feed my baby ……..3
Never really discussed the matter with her ……...4

19. Does the baby's father have any preference for how you feed your baby?

He prefers bottle-feeding……1
He prefers breastfeeding ……..……..2
He doesn't mind how I feed my baby ……...3
Never really discussed the matter with him……...4

20. Have you ever attended any antenatal classes on how to feed your baby?

Yes, for this pregnancy ……. 1
Yes, for a previous pregnancy ……...2
No……..3

21. How was your baby delivered?

Vaginal……1
Caesarean……2

22. Did your baby have any health problems while in hospital?

Yes……. 1
No……...2
If yes, what were the health problems? _____

23. Did you have any health problems during this pregnancy?

None……1
Yes, high blood pressure……..2
Yes, high blood glucose level……..…3
Others:_____

24. Did you smoke cigarettes?

No……..…1
Yes, before I became pregnant……..…2
Yes, while I was pregnant……3

How many cigarettes do you smoke every day before pregnancy? ___

How many cigarettes did you smoke every day while pregnant? _____

25. Did you drink alcohol while pregnant?

No…….. 0
Yes……. 1
a. How many glasses (drinks) per **week? _____**

26. Is your breastmilk enough for your baby?

Yes……. 1
No……...2
Don't know…….3

27. How do you know that you have enough breastmilk? (one or more answers)

Breast is engorged……..1
Baby is full after breastfeeding……..2
Baby is satisfied…….....3
Can feel effective sucking……..4
Other:_____

28. If breastmilk is not enough, what do you do? _____

29. Why did you decide to breastfeed? (one or more answers)

The baby's father wanted me to breastfeed……...1
Breast milk is better for the baby ……..…2
Breast-fed babies are more intelligent……..…..3
Breastfeeding is the right thing to do ……..…..4
Breastfeeding is cheaper…….....5
Breastfeeding is more convenient…….....6
Breastfeeding helps you losing weight…….....7
Breastfeeding is fashionable…….....8
Mother and baby become closer……9
Emptying breast is good for mother……...10
_____advised me to breastfeed
Other (please specify)_____

30. How long do you intend to breastfeed your baby? _____ (months)

31. At what age do you plan to start giving your baby its first solid food? _____ (months)

32. Have you experienced any of the following since you started breastfeeding? (one or more answers)

A painful swelling of part of your breast
(pink, tender, hot, swollen area of the breast)……1
When you had a sore breast did you have a high temperature (fever)?.....2
When you had a sore breast did you have body aches, or headaches?.....3
Did a nurse or doctor tell you that you had a breast problem?.....4
Cracked or sore nipples ……5
Baby gets too much milk……6
Takes a long time before milk starts flowing at start of feed ……7
Baby has problems sucking……8
Baby doesn't wake up for feeds……9
Not enough milk or colostrum for baby……10
Other (please specify) _____

33. How old was the baby when you had breast problem(s)? _____weeks

34. What is your occupation? _____

35. Were you employed or studying outside home in the past 6 months?

Yes, full-time……. 1
Yes, part-time…….2
No……...3

36. What do you plan to do in the next 6 months?

Will still be home with the baby…….1
Work full-time……2
Work part-time……3
Undecided……...4
Others_____

37. How long will you stay with baby at home before you go to work or study?

For delivery leave (100 days)…….1
6-12 months……2
1 year or more…….3

38. Who will mainly take care of you baby after you go to work?

My mother……...1
My mother in law……...2
Nursemaid……...3
Myself…….4
Other: _____

39. How is your health condition?

Excellent…….1
Not good…….2
Details? _____

C. TERMINATION OF BREASTFEEDING ONLY (If still breastfeeding go to Q48)

40. **How old was your baby when you stopped breastfeeding**? _____ weeks

41. Why did you decide to stop breast- feeding?

_____

42. Did anyone advise you to stop breastfeeding? Who?

_____

43. Did you plan to stop breastfeeding when you did? Yes…….1
No……2

44. Were you disappointed for not breastfeeding for longer? Yes…….1
No……..2

45. Do you feel guilty for not breastfeeding for longer? Yes…….1
No……..2

46. Have other people made you feel guilty for not breastfeeding for longer?
Yes…….1 No……..2

47. Would you breastfeed another child if you had another baby?
Yes…….1 No……2 Yes, if I could……3

a.**Why**? _____

B. Risk Factors for Postnatal Depression

48. Where do you live during the confinement?

My house……1
Parents house……..2
Brothers/sisters……...3
Relatives……4
Others (please specify)_____

49.Did you get practical/emotional support during confinement?

Yes ……..…….....….1
No…… ……..2

_____

50. From whom did you get the support?

Husband/Partner……1
Mother……2
Sister……3
In-laws……4
Relatives……5
Neighbour……6
Others (please specify)_____

51. How often did you get the support?

Always……1
Sometimes……2
Seldom……3

52. Did your husband/partner help you to take care of the baby?

Yes……1
No……2

53.If yes, how often

Always……1
Sometimes……2
Seldom……3
Never……4

54. Does he help you with the housework?

Always……1
Sometimes……2
Seldom……3
Never……4

55. Are you satisfied with your husband's help during confinement?

Yes……1
No……2
Please specify:_____

56. How is your relationship with your husband/partner?

Good……1
Bad……2

57. Are you happy with the relationship?

Yes……1
No……2

58. Is he happy with the pregnancy and the birth of your child?

Yes……1
No……2

59. Do you have any problem with childcare during confinement?

Yes……1
No……2

60. Are you constantly worried about the baby?

Yes……..…1
No…….…….2

a. If yes, why?_____

61. Who helps you to take care of other children (if there are) ?

Husband/Partner……1
Mother……2
Sister……...3
In-laws……4
Relatives……..5
Neighbour……..6
Others (please specify)_____

62. Have you been depressed before?

Yes……1
No……2

63.Have you been treated for depression before?

Yes……1
No……2

64. Did you feel sad unnecessarily within first week after childbirth?

Yes……1
No……2

64a. If yes, please state the reason(s)? _____

65. What did you do to overcome the sadness?

(Please state)_____

Is your baby very demanding?

Yes ……....1
No……...2

66. How does this affect your life?

Feel sad…….……...1
Feel depressed……..……2
Feel normal/used to it…….….3
Others _____

67. Do you know why your baby was very demanding?

Not feeding well……...1
Sick …….….2
Colic……3
Don't know……..4
Other reason(s)_____

68. Are you feeling sad/ depressed now?

Yes……1
No……2

69. Do you have any problem which haunts you most of the time?

Yes……1
No……2

70. Can the problem be settled?

Yes……1
No……2

71. Do you seek help?

Yes……1
No……2

74. Have you experienced any major changes in your life since I spoke to you last?

Yes……..…1
No……2

75.Are you happy with the pregnancy?

Yes……1
No……2

76. Was the pregnancy an unplanned/unwanted one?

Yes……1
No……2

77. Are you satisfied with the baby's gender?

Yes……1
No……2

78. Did you have emotional problem during the last pregnancy?

Yes……1
No……...……2

79. What kind of emotional problem do you have?

i) antenatal anxiety……1
ii) antenatal depression……...2
iii) antenatal depression with anxiety……..3
iv) antenatal eating disorder difficulty……4
v) other (please specify) _____

80. Did you have any concern/worries during the previous pregnancy?

Yes……..…1
No……...2

81. Have you experienced any of the following after delivery? Please tick

a. loss of appetite……. ☐
b. insomnia…….. ☐
c. irritability…… ☐
d. guilt……. ☐
e. low mood……. ……. ☐

82. Have you had any major stresses, changes or losses in the course of this pregnancy (separation, moving house, domestic violence, bereavement)?

Yes……1
No……2
If yes, please list _____

83. To what extend has this stress affected your emotional wellbeing?

A great deal ……1
A little……..……....2
No effect ……..…….. 3

84. Would you generally consider yourself a worrier?

Yes…….……...1
No……2

85. In general, are you the sort of person who has trouble finishing jobs because you want to get it exactly right?

Yes……1
No……2

86. Do you generally like yourself as a person?

Yes……1
No……2

87. Do you practice special routine throughout the confinement period?

Yes…….….1
No…….…….2
If yes, please list _____

88.How long did you practice them?

From birth till now…..……1
A few days..…….……...2
1 - 2 weeks……..3
2 - 3 weeks……..4

89. Did you have traditional massage during confinement?

Yes……..…1
No……...2

90. Did you wear traditional corset during confinement?

Yes……..…1
No……...2

91. Did you take traditional medicine during confinement?

No……...1
Yes……..…2
If yes, please specify_____

92. Do you have any food taboos during confinement?

No……...1
Yes……..2
If yes, please specify_____

93. Were you confined in the house only?

Yes……..…1
No……...2

94. Do you practice any postnatal rituals during confinement?

No……...2
Yes……..…1
If yes, please specify_____

95. How do you feel about the confinement practices?

Good…….……...1
Bad……..2
Neutral…….……3

96. Do you think the practices help you regain health?

Yes……...1
No…….……...2
Don't know…….…… 3

C. EDINBURGH POSTNATAL DEPRESSION SCALE

Cross the answer which comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today.

1. I have been able to laugh and see the funny side of things.

0. As much as I always could
1. No quite so much now
2. Definitely not so much
3. Not at all

2. I have looked forward with enjoyment to things.

0. As much as I ever did
1. A little less than I used to
2. Definitely less than I used to
3. Hardly at all

3. I have blamed myself unfairly when things went wrong.

0. No, never
1. Not very often
2. Yes, some of the time
3. Yes, most of the time

4. I have been anxious or worried for no real reason.

0. No, not at all
1. Hardly ever
2. Yes, sometimes
3. Yes, very often

5. I have felt scared or panicky for no real reason.

0. No, not at all
1. Hardly ever
2. Yes, sometimes
3. Yes, very often

6. Things have been too much for me.

0. No, I have been coping as well as ever
1. No, most of the time I have coped quite well
2. Yes, sometimes I haven't coped as well as usual
3. Yes, most of the time I haven't been able to cope at all

7. I have been so unhappy that I have had trouble sleeping.

0. No, not at all
1. Not very often
2. Yes, sometimes
3. Yes, most of the time

8. I have felt sad or miserable

0. No, not at all
1. Not very often
2. Yes, quite often
3. Yes, most of the time

9. I have been so unhappy that I have cried.

0. No, never
1. Only once in a while
2. Yes, quite often
3. Yes, most of the time

10. I have thought of hurting myself.

0. Never
1. Hardly ever
2. Sometimes
3. Yes, quite often

THANK YOU VERY MUCH FOR YOUR PARTICIPATION.

Interviewer signature : _____

Appendix E: QUESTIONNAIRE 3 (3 and 6 months postpartum)

Curtin University of Technology

Breastfeeding and Postpartum Depression Study

2009

Questionnaire 3 at 3 and 6 months postpartum

Interview Date: _____/___/_____ Interviewer Code:_____

Mother's name: _____

ID Number _____Ethnic group _____

Tel: (home) _____ (mobile)_____

Address: _____

Maternal and Child Health Clinics:

Kota Kinabalu……..……..…1 Luyang…….. 4
Putatan…….. 2 Inanam……..……5
Penampang …….…. 3

Baby's Date of Birth: ___/_____/_____ Baby's gender? Male 1 Female 2

A. BREASTFEEDING FOLLOW-UP INFORMATION

1. How are you feeding your baby now?

Breastfeeding only……..1
Breastfeeding + (sugar) water ……2
Breastfeeding + juice……..3
Mainly breast-feeding but "topping up" with bottle-feeding……. 4
Mainly bottle-feeding but also breast-feeding……5
Bottle-feeding only…….6
Other(please specify): _____

2. How many times per day on average do you feed your baby (24 hours)? _____

3.How many of these feeds would be breast-feeds (in 24 hours)? _____

4. How many of these feeds would be formula-feeds (in 24 hours)? _____

5. What is the average length of each feeding episode?

Less than15 minutes……..1 Between 30 minutes and 1 hour……3
Between 15 and 30…….2 More than 1 hour…...……4

6. Have you changed the way you feed your baby since the last interview?

Yes……1
No…….2

a. If you have changed feeding method, why? _____
b. How old was the baby when you changed? _____ (weeks)
c. What is the change? Started solids……1
Started formula……..…2
Started other milk…….3
Others: _____

7. If you are bottle-feeding, what type of formula are you using? _____
The brand _____

8. When did you begin your baby on this formula? _____ (weeks)

9. Why did you choose this particular formula? _____

10. Who decided to change the way you feed your baby? (You may choose more than one answer)

Myself……1 Baby's father……..2
My mother……..3 Doctor…….4
Nurse……..5 Others: _____

1. If you have gone back to work, how many times can you breastfeed during working hours _____

12. At what age do you plan to first give your baby solids?_____(months)

13. Is your breast milk enough for your baby?

Yes……..…1 No…….2
Don't know……3

14. If breast milk is not enough, how do you deal with it?

_____

15. Do you use any special food or herbal preparation to promote the production of breast milk?

Yes…….. 1
No…….2 If Yes, please specify _____

16. Have you had any of these difficulties with breast-feeding since I spoke to you last time?

Not enough milk for baby……1
Cracked or sore nipples…….2
Mastitis or breast infection……3
Breasts engorged (too full)……4
Inverted nipples…….5
Breast-feeding is painful…….....6
My health condition is not good…….....7
Others: _____

17. Has your baby had any of the following since the last interview?

Baby not gaining enough weight……..1
Baby has difficulties sucking……2
Baby refuses to breast-feed……...3
Baby too tired to feed i.e. falls asleep at breast……4
Other: _____

18. Questions on problems with your breasts. In the past 4 weeks have you had?

A painful swelling of part of your breast (pink, tender, hot, swollen area of the breast)……..…..1
When you had a sore breast did you have a high temperature (fever)? 2
When you had a sore breast did you have body aches, or headaches?.....3
Did a nurse or doctor tell you that you had a breast problem? ……4
Any other difficulties with breastfeeding? _____

19. Have you asked for advice or help from anyone about your breast-feeding problem(s)? If yes, who? _____

20. Did you take any medicine for breast pain or swelling in the past 4 weeks?
Yes…….1
No……..2

20a. What was it? _____

21.Has your baby experienced any of these health problems since I spoke to you last?
Vomiting……1
Diarrhoea…….2
Respiratory illness…….3
Skin – rash, dermatitis, etc……4
Jaundice……..5
Colic……..6
Other problem (baby):_____

22. Did you take your baby to any health professionals regarding the problem?
Yes……1 No……2
22a. If yes, who? _____

23. Total number of visits to health professionals since last interview _____

24. Have you experienced any health problems since I spoke to you last?
Yes……1 No…….2
If yes, the problem is: _____

25. Did you see a health professional about this problem?
Yes……1 No……..2
If yes, who? _____

26. How long do you intend to breastfeed (breastfeeding + other food)your baby?

27. How do you feel about your baby's weight since birth?
Satisfied / pleased ……..1
A little concerned because too small……..2
Very worried or concerned because too small……3
A little concerned because too big……..4
Very worried or concerned because too big……5

28. Have you seen any advertisements for infant formula since we last spoke?
Yes…….1 No……..2
a. If yes, where did you see the ad?_____

29. Since your last interview, have you been drinking tea/
Yes…….1 No……..2

a. What kind of tea did you drink most often? _____
b. How many cups per day did you drink? _____

30. What is your weight? _____ (kg) date measured? ____/____/_____

31. Do you smoke cigarettes?

Yes……1 No…….2

b. How many cigarettes do you smoke every day? _____

32. Does the baby's father smoke?

Yes…….1 No…….2

How many cigarettes does he smoke every day? _____

33. Do you drink alcohol?

Yes……1 No……2

How many glasses (drinks) per week? _____
What kind do you drink most often? Beer 1. wine 2 , other? 3

34. Do you take any contraceptive pills?

Yes……1 No……2
If yes, what type? _____ what brand? _____

35. How would you rate your confidence in breastfeeding?

Totally Not Confident……1
Not confident……..2
Neutral……3
Confident……4
Very Confident……...5

36. How enjoyable do you find breastfeeding?

Totally not enjoyable…..……1
Not enjoyable……..2
Neutral……3
Enjoyable……4
Very Enjoyable……...5

37. How satisfied are you with your breastfeeding experience?

Totally not satisfied..……..……1
Not satisfied.…….……..2
Neutral……3
Satisfied..……4
Very satisfied..…….……...5

38. In general, how comfortable do you feel while breastfeeding in front of other people?

Totally not comfortable...……1
Not comfortable……..2
Neutral……3
Comfortable……4
Very Comfortable……...5

39. Summary of breastfeeding

Exclusive breastfeeding duration _____ weeks
Any breastfeeding duration _____ weeks or still breastfeeding (please tick) ☐
Age introduced solid foods _____ weeks

40. Summary of Baby's Growth

Age (Months)	Weight (kg)	Feeding Method
1		
2		
3		
4		
5		
6		

B. TERMINATION OF BREASTFEEDING ONLY (If still breastfeeding go to Section C)

41. **How old was your baby when you stopped breast-feeding**? _____ weeks

42. **Why did you decide to stop breast- feeding**? _____

43. **Did anyone advise you to stop breast-feeding**? Who? _____

44. **Did you plan to stop breast-feeding when you did**? Yes…….1 No…..…..2

45. **Were you disappointed for not breast-feeding for longer**? Yes…….1 No…….2

46. **Do you feel guilty for not breast-feeding for longer?** Yes…….1 No……...2

47. **Have other people made you feel guilty for not breast-feeding for longer**?
Yes……1 No……..2

48. **Would you breast-feed another child if you had another baby**?
Yes……1 No……2 Yes, if I could……3
a. **Why**? _____

C. EDINBURGH POSTNATAL DEPRESSION SCALE

Cross the answer which comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today.

1. I have been able to laugh and see the funny side of things.
0. As much as I always could
1. No quite so much now
2. Definitely not so much
3. Not at all

2. I have looked forward with enjoyment to things.
0. As much as I ever did
1. A little less than I used to
2. Definitely less than I used to
3. Hardly at all

3. I have blamed myself unfairly when things went wrong.

0. No, never
1. Not very often
2. Yes, some of the time
3. Yes, most of the time

4. I have been anxious or worried for no real reason.

0. No, not at all
1. Hardly ever
2. Yes, sometimes
3. Yes, very often

5. I have felt scared or panicky for no real reason.

0. No, not at all
1. Hardly ever
2. Yes, sometimes
3. Yes, very often

6. Things have been too much for me.

0. No, I have been coping as well as ever
1. No, most of the time I have coped quite well
2. Yes, sometimes I haven't coped as well as usual
3. Yes, most of the time I haven't been able to cope at all

7. I have been so unhappy that I have had trouble sleeping.

0. No, not at all
1. Not very often
2. Yes, sometimes
3. Yes, most of the time

8. I have felt sad or miserable

0. No, not at all
1. Not very often
2. Yes, quite often
3. Yes, most of the time

9. I have been so unhappy that I have cried.

0. No, never
1. Only once in a while
2. Yes, quite often
3. Yes, most of the time

10. I have thought of hurting myself.

0. Never
1. Hardly ever
2. Sometimes
3. Yes, quite often

D. **IOWA INFANT FEEDING ATTITUDE SCALE**

For each of the following statements, please indicate how much you agree or disagree by circling the number that most closely corresponds to your opinion. The number '1' indicates strong disagreement, whereas '5' indicates strong agreement.

		Strongly disagree				**Strongly agree**
a	The nutritional benefits of breast milk last only until the baby is weaned from breast milk	1	2	3	4	5
b	Formula-feeding is more convenient than breast-feeding	1	2	3	4	5
c	Breast-feeding increases mother-infant bonding	1	2	3	4	5
d	Breast milk is lacking in iron	1	2	3	4	5
e	Formula-fed babies are more likely to be overfed than breast-fed babies	1	2	3	4	5
f	Formula-feeding is the better choice if the mother works outside the home	1	2	3	4	5
g	Mothers who formula-feed miss one of the great joys of motherhood	1	2	3	4	5
h	Women should not breast-feed in public places such as restaurants	1	2	3	4	5
i	Babies who are fed breast milk are healthier than babies who are fed formula	1	2	3	4	5
j	Breast-fed babies are more likely to be overfed than formula-fed babies	1	2	3	4	5
k	Fathers feel left out if a mother breast-feeds	1	2	3	4	5
l	Breast milk is the ideal food for babies	1	2	3	4	5
m	Breast milk is more easily digested than formula	1	2	3	4	5
n	Formula is as healthy for an infant as breast milk	1	2	3	4	5
o	Breast-feeding is more convenient than formula-feeding	1	2	3	4	5
p	Breast milk is less expensive than formula	1	2	3	4	5
q	A mother who occasionally drinks alcohol should not breast-feed her baby	1	2	3	4	5

THANK YOU VERY MUCH FOR YOUR PARTICIPATION.

APPENDIX F: PART OF RESULTS FROM QUESTIONNAIRE 2

RESULTS OF CHI-SQUARE TESTS FOR VARIABLES AT 1 MONTH POSTPARTUM VISIT

	EPDS<12	EPDS≥12	Total	p-value
Baby's gender				0.199
Girl	679 (93.3)	49 (6.7)	728	
Boy	768 (91.5)	71 (8.5)	839	
Baby's birth weight				0.392
<2500 gm.	117 (90.7)	12 (9.3)	129	
≥2500 gm.	1168 (92.8)	91 (7.2)	1259	
Feed before discharged				0.362
Breastmilk only	1299 (92.6)	104 (7.4)	1403	
Breastmilk and glucose	11 (100)	0	11	
Mostly breastmilk but also formula	93 (88.6)	12 (11.4)	105	
Mostly formula but also breastmilk	19 (86.4)	3 (13.6)	22	
Formula feed only	17 (94.4)	1 (5.6)	18	
Baby's first feed				0.593
Breastmilk	1367 (92.2)	115 (7.8)	1482	
Formula feed	41 (91.1)	4 (8.9)	45	
Glucose/water	21 (100)	0	21	
Don't know/can't remember	15 (93.8)	1 (6.3)	16	
How long before first feed				0.538
Less than an hour	847 (91.6)	78 (8.4)	925	
1-4 hours	358 (93.7)	24 (6.3)	382	
More than 4 hours but less than a day	63 (90.0)	7 (10.0)	70	
More than a day after being born	72 (92.3)	6 (7.7)	78	
Don't know	91 (94.8)	5 (5.2)	96	
The feed now (at 1 month)				0.164
Breastmilk only	956 (92.8)	74 (7.2)	1030	
Breastmilk and glucose/fruit juice/water	17 (89.5)	2 (10.5)	19	
Mostly breastmilk but added formula-feed	361 (92.8)	28 (7.2)	389	
Mostly formula but added breastmilk	50 (84.7)	9 (15.3)	59	
Formula-feed only	56 (88.9)	7 (11.1)	63	
Average feeding time				0.118
Less than 15 minutes	232 (90.6)	24 (9.4)	256	
Between 15 and 30 minutes	602 (92.9)	46 (7.1)	648	
Between 30 minutes and an hour	205 (90.3)	22 (9.7)	227	
More than an hour	334 (95.2)	17 (4.8)	351	

Section A: Mothers who have stopped breastfeeding by 1 month

	EPDS<12	EPDS≥12	Total	p-value
Did mothers tried to breastfeed				0.288
No	10 (90.9)	1 (9.1)	11	
Yes	224 (90.0)	25 (10.0)	249	
Why change to formula				0.109
Not enough milk	65 (90.3)	7 (9.7)	72	
Working	43 (89.6)	5 (10.4)	48	
Baby refused breastmilk	10 (100)	0	10	
Problems with breast	15 (88.2)	2 (11.8)	17	
Under medical treatment	4 (66.7)	2 (33.3)	6	
Others	8 (80)	2 (20)	10	
Why give infant formula				0.386
Better than cow's milk	38 (86.4)	6 (13.6)	44	
Better than breastmilk	34 (94.4)	2 (5.6)	36	
Hospital staff asked me to	3 (100)	0	3	
When made decision of baby's feed				
After baby was born	112 (88.9)	14 (11.1)	126	0.253
Before I was pregnant	24 (92.3)	2 (7.7)	26	
Early stage of pregnancy	52 (94.5)	3 (5.5)	55	
Later stage of pregnancy	13 (81.3)	3 (18.8)	16	
Who helps made decision how baby would be fed				**0.002**
Nobody	127 (88.8)	16 (11.2)	143	
Husband	21 (91.3)	2 (8.7)	23	
Mother	8 (88.9)	1 (11.1)	9	
Doctor/nurse	24 (96.0)	1 (4.0)	25	
Why do mothers chose to formula-feed				
Formula feeding is as good as breastfeeding	47 (94.0)	3 (6.0)	50	
Formula-feed is easier	6 (100)	0	6	
I will go back to work	57 (86.4)	9 (13.6)	66	
Breastfeeding will make my breasts sag	1 (100)	0	1	
The baby's father prefers formula-feeding	1 (100)	0	1	
My mother suggested formula-feed	3 (100)	0	3	
My health problem	15 (88.2)	2 (11.8)	17	

Section B: Responses of all mothers

	EPDS<12	EPDS≥12	Total	p-value
Baby's maternal grandmother breastfeed any of her children for more than 1 month				0.802
No	67 (90.5)	7 (9.5)	74	
Yes	1073 (92.3)	90 (7.7)	1163	
Don't know	272 (92.8)	21 (7.2)	293	
Baby's maternal grandmother preference				
Prefers formula feeding	56 (93.3)	4 (6.7)	60	0.650
Prefers breastfeeding	953 (92.9)	73 (7.1)	1026	
Doesn't mind how baby is fed	160 (92.0)	14 (8.0)	174	
Never really discussed	253 (90.7)	26 (9.3)	279	
Baby's father preference				0.108
He prefers formula-feeding	48 (88.9)	6 (11.1)	54	
He prefers breastfeeding	1044 (93.4)	74 (6.6)	1118	
Doesn't mind how baby is fed	203 (91.0)	20 (9.0)	223	
Never really discussed	133 (88.7)	17 (11.3)	150	
Attended breastfeeding classes at antenatal visits				0.772
Yes, for this pregnancy	491 (92.3)	41 (7.7)	532	
Yes, for a previous pregnancy	231 (92.4)	19 (7.6)	250	
No	667 (92.1)	57 (7.9)	724	
Yes, for previous and this one	33 (97.1)	1 (2.9)	34	
Method of delivery				0.059
Vaginal	1302 (91.9)	114 (8.1)	1416	
Caesarean	134 (96.4)	5 (3.6)	139	
Baby's health problem in hospital				0.798
No	1230 (92.5)	100 (7.5)	1330	
Yes	195 (92.0)	17 (8.0)	212	
Is breastmilk enough?				
No	246 (89.1)	30 (10.9)	276	0.087
Yes	1096 (93.0)	82 (7.0)	1178	
Don't know	92 (92.9)	7 (7.1)	99	
How long intend to breastfeed?				0.381
1 to 6 months	296 (90.5)	31 (9.5)	327	
7 to 12 months	286 (92.6)	23 (7.4)	309	
13 to 24 months	283 (93.1)	21 (6.9)	304	
More than 24 months	42 (91.3)	4 (8.7)	46	

Section B: Responses of all mothers (cont.)

	EPDS<12	EPDS≥12	Total	p-value
Plan to start on solids				0.225
<6 months	416 (91.4)	39 (8.6)	455	
6 months	924 (93.1)	69 (6.9)	993	
> 6 months	59 (88.1)	8 (11.9)	67	
Work or study for the past six months				**0.029**
Yes, full time	285 (91.9)	25 (8.1)	310	
Yes, part time	87 (86.1)	14 (13.9)	101	
No	1042 (93.3)	75 (6.7)	1117	
Plan to do in the next 6 months				0.529
Will still be home with the baby	539 (91.7)	49 (8.3)	588	
Work full time	250 (91.2)	24 (8.8)	274	
Work part time	79 (88.8)	10 (11.2)	89	
Undecided	344 (93.2)	25 (6.8)	369	
Mothers health condition				
Excellent	1423 (92.5)	115 (7.5)	1538	0.101
Not good	28 (84.8)	5 (15.2)	33	
When stopped breastfeeding do you plan to stop				0.076
No	57 (90.5)	6 (9.5)	63	
Yes	22 (81.5)	5 (18.5)	27	
Are you disappointed for not breastfeeding longer				
No	27 (90.0)	3 (10.0)	30	0.327
Yes	50 (87.7)	7 (12.3)	57	
Do you feel guilty for not breastfeeding for longer				
No	33 (86.8)	5 (13.2)	38	0.183
Yes	43 (87.8)	6 (12.2)	49	
Anybody made you feel guilty for not breastfeeding for longer				
No	65 (90.3)	7 (9.7)	72	**0.023**
Yes	12 (75.0)	4 (25.0)	16	
Would you breastfeed another child if you had another baby				
No	9 (81.8)	2 (18.2)	11	0.262
Yes	40 (87.0)	6 (13.0)	46	
Yes if I could	31 (91.2)	3 (8.8)	34	

Section B: Responses of all mothers (cont.)

	EPDS<12	EPDS≥12	Total	p-value
Are you happy with the relationship?				
No	17 (53.1)	15 (46.9)	32	**0.000**
Yes	1420 (93.3)	102 (6.7)	1522	
Is he happy with the pregnancy and the birth of your child?				
No	56 (93.3)	4 (6.7)	60	0.834
Yes	1379 (92.6)	110 (7.4)	1489	
Do you have any problem with childcare during confinement?				
No	1204 (93.1)	89 (6.9)	1293	**0.011**
Yes	232 (88.5)	30 (11.5)	262	
Are you constantly worried about the baby?				
No	656 (95.2)	33 (4.8)	689	**0.000**
Yes	752 (90.1)	83 (9.9)	835	
Have you been depressed before?				
No	1160 (95.5)	55 (4.5)	1215	**0.000**
Yes	269 (81.5)	61 (18.5)	330	
Have you been treated for depression before?				
No	1362 (92.2)	116 (7.8)	1478	0.977
Yes	24 (92.3)	2 (7.7)	26	
Did you feel sad unnecessarily within first week after childbirth?				
No	1292 (94.7)	73 (5.3)	1365	**0.000**
Yes	112 (71.8)	44 (28.2)	156	
Is your baby very demanding?				
No	996 (92.5)	81 (7.5)	1077	0.854
Yes	414 (92.2)	35 (7.8)	449	
How does this affect your life?				
Feel sad	34 (73.9)	12 (26.1)	46	**0.000**
Feel depressed	65 (76.5)	20 (23.5)	85	
Used to it	817 (92.9)	62 (7.1)	879	

Section B: Responses of all mothers (cont.)

	EPDS<12	EPDS≥12	Total	p-value
Why your baby was very demanding?				
Not feeding well	917 (92.3)	77 (7.7)	994	0.276
Sick	99 (95.2)	5 (4.8)	104	
Colic	120 (90.9)	12 (9.1)	132	
Not comfortable	7 (87.5)	1 (12.5)	8	
Wants to be hold or attend to	5 (100)	0	5	
Don't know	151 (87.8)	21 (12.2)	172	
Are you feeling sad/ depressed now?				
No	1236 (94.7)	69 (5.3)	1305	**0.000**
Yes	147 (76.2)	46 (23.8)	193	
Do you have any problem which haunts you most of the time?				
No	1252 (94.8)	68 (5.2)	1320	**0.000**
Yes	184 (78.3)	51 (21.7)	235	
Can the problem be settled?				
No	244 (87.1)	36 (12.9)	280	**0.000**
Yes	495 (90.7)	51 (9.3)	546	
Do you seek help?				
No	401 (90.1)	44 (9.9)	445	**0.000**
Yes	313 (88.4)	41 (11.6)	354	
Have you experienced any major changes in your life since I spoke to you last?				
No	660 (91.8)	59 (8.2)	719	0.160
Yes	589 (93.8)	39 (6.2)	628	
Are you happy with the pregnancy?				
No	29 (90.6)	3 (9.4)	32	0.708
Yes	1399 (92.4)	115 (7.6)	1514	
Was the pregnancy an unplanned/unwanted one?				
No	962 (92.9)	74 (7.1)	1036	0.202
Yes	455 (91.0)	45 (9.0)	500	
Are you satisfied with the baby's gender?				
No	158 (90.8)	16 (9.2)	174	0.704
Yes	564 (92.6)	45 (7.4)	609	
I don't mind	711 (92.6)	57 (7.4)	768	

Section B: Responses of all mothers (cont.)

	EPDS<12	EPDS≥12	Total	p-value
Did you have emotional problem during the last pregnancy?				
No	1226 (94.8)	67 (5.2)	1293	**0.000**
Yes	182 (78.1)	51 (21.9)	233	
What kind of emotional problem do you have?				
antenatal anxiety	237 (90.5)	25 (9.5)	262	**0.000**
antenatal depression	44 (89.8)	5 (10.2)	49	
antenatal depression with anxiety	69 (72.6)	26 (27.4)	95	
antenatal eating disorder difficulty	119 (93.0)	9 (7.0)	128	
2 or more of the above	46 (82.1)	10 (17.9)	56	
Did you have any concern/worries during the previous pregnancy?				
No	1125 (94.9)	60 (5.1)	1185	**0.000**
Yes	245 (81.4)	56 (18.6)	301	
Have you had any major stresses, changes or losses in the course of this pregnancy (separation, moving house, domestic violence, bereavement)?				
No	1324 (93.4)	94 (6.6)	1418	**0.000**
Yes	82 (77.4)	24 (22.6)	106	
To what extend has this stress affected your emotional wellbeing?				
A great deal	43 (71.7)	17 (28.3)	60	**0.000**
A little	74 (77.1)	22 (22.9)	96	
No effect	542 (92.3)	45 (7.7)	587	
Would you generally consider yourself a worrier?				
No	581 (95.7)	26 (4.3)	607	**0.000**
Yes	825 (90.2)	90 (9.8)	915	
Do you have trouble finishing jobs because you want to get it exactly right?				
No	615 (93.3)	44 (6.7)	659	0.183
Yes	784 (91.5)	73 (8.5)	857	
Do you generally like yourself as a person?				
No	88 (86.3)	14 (13.7)	102	**0.015**
Yes	1328 (92.9)	102 (7.1)	1430	

Section B: Responses of all mothers (cont.)

	EPDS<12	EPDS≥12	Total	p-value
Practise special routine throughout the confinement period				
No	619 (92.0)	54 (8.0)	673	0.700
Yes	790 (92.5)	64 (7.5)	854	
How long did you practice them?				
Less than a week	50 (92.6)	4 (7.4)	54	
1-3 weeks	252 (89.0)	31 (11.0)	283	
1 month or more	481 (92.9)	37 (7.1)	518	
Have traditional massage during confinement				
No	1062 (92.4)	87 (7.6)	1149	0.996
Yes	378 (92.4)	31 (7.6)	409	
Wear traditional corset during confinement				
No	989 (91.9)	87 (8.1)	1076	0.406
Yes	422 (93.2)	31 (6.8)	453	
Take traditional medicine during confinement				
No	625 (93.4)	44 (6.6)	669	0.205
Yes	807 (91.7)	73 (8.3)	880	
Have any food taboos during confinement				
No	998 (93.4)	71 (6.6)	1069	**0.035**
Yes	427 (90.3)	46 (9.7)	473	
Confined in the house only				
No	895 (93.6)	61 (6.4)	956	**0.016**
Yes	528 (90.3)	57 (9.7)	585	
Practice postnatal rituals during confinement				
No	1223 (92.4)	100 (7.6)	1323	0.705
Yes	199 (91.7)	18 (8.3)	217	
Feelings about the confinement practices				
Good	1034 (93.7)	70 (6.3)	1104	**0.010**
Bad	110 (90.9)	11 (9.1)	121	
Neutral	282 (88.7)	36 (11.3)	318	
The confinement practices help regain health				**0.027**
No	90 (91.8)	8 (8.2)	98	
Yes	1023 (93.4)	72 (6.6)	1095	
Don’t know	318 (89.1)	39 (10.9)	357	

Table : EPDS Group by 3 months and 6 months variables

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
The feed now				0.169				0.157
Exclusive breastfeeding	587 (49.5)	39 (42.4)	626		384 (35.9)	25 (26.9)	409	
Full breastfeeding	8 (0.7)	2 (2.2)	10		10 (0.9)	1 (1.1)	11	
Any breastfeeding	456 (38.4)	36 (39.1)	492		478 (44.7)	42 (45.2)	520	
Formula-feeding	136 (11.5)	15 (16.3)	151		197 (18.4)	25 (26.9)	222	
Total	1187	92	1279		1069	93	1162	
Average feeding time				**0.020**				**0.034**
Less than 15 minutes	126 (10.9)	11 (12.0)	137		86 (8.4)	7 (7.7)	93	
Between 15 and 30 minutes	434 (37.7)	34 (37.0)	468		288 (28.0)	18 (19.8)	306	
Between 30 minutes and 1 hour	172 (14.9)	13 (14.1)	185		171 (16.6)	9 (9.9)	180	
More than an hour	420 (36.5)	34 (37.0)	454		484 (47.0)	57 (62.6)	541	
Total	1152	92	1244		1029	91	1120	
Change way baby fed since last interview				0.857				0.450
No	698 (60.6)	53 (61.6)	751		556 (54.8)	44 (50.6)	600	
Yes	453 (39.4)	33 (38.4)	486		459 (45.2)	43 (49.4)	502	
Total	1151	86	1237		1015	87	1102	

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
Why change way baby fed				0.785				0.107
Not enough milk	192 (49.4)	15 (53.6)	207		250 (57.2)	29 (58.0)	279	
I'm working	108 (27.8)	8 (28.6)	116		85 (19.5)	3 (6.0)	88	
Baby refused breastmilk	43 (11.1)	1 (3.6)	44		38 (8.7)	6 (12.0)	44	
Convenience	31 (8.0)	3 (10.7)	34		12 (2.7)	2 (4.0)	14	
Others	15 (3.9)	1 (3.6)	16		52 (11.9)	10 (20.0)	62	
Total	389	28	417		437	50	487	
Baby's age when change the feed				0.792				0.536
0-4 weeks/0-12 weeks#	107 (26.2)	7 (26.9)	114		286 (56.1)	32 (52.5)	318	
5-8 weeks/13-18 weeks#	150 (36.8)	11 (42.3)	161		98 (19.2)	10 (16.4)	108	
9-12 weeks /19-24 weeks#	151 (37.0)	8 (30.8)	159		126 (24.7)	19 (31.1)	145	
Total	408	26	434		510	61	571	
What is the change				0.366				**0.035**
Started solids	52 (10.3)	7 (15.6)	59		171 (88.6)	22 (11.4)	193	
Started formula	334 (66.1)	24 (53.3)	358		147 (92.5)	12 (7.5)	159	
Started solids and formula	105 (20.8)	12 (26.7)	117		9 (100)	0	9	
Others	14 (2.8)	2 (4.4)	16		273 (89.5)	32 (10.5)	305	
Total	505	45	550					
Who decided to change the way you feed your baby				0.181				**0.005**
Myself	635 (82.6)	47 (75.8)	682		698 (86.2)	54 (74.0)	752	
Others	134 (17.4)	15 (24.2)	149		112 (13.8)	19 (26.0)	131	
Total	769	62	831		810	73	883	

At what age plan to give solids*				0.140				0.109
> 6 months	278 (23.9)	29 (32.9)	307		210 (22.5)	24 (30.4)	234	
6 months	854 (73.4)	56 (63.6)	910		725 (77.5)	55 (69.6)	780	
> 6 months	32 (2.7)	3 (3.4)	35		935	79	1014	
Total	1164	88	1252					
Breastmilk enough for baby				**0.000**				**0.000**
No	379 (32.6)	43 (47.3)	422		398 (38.4)	53 (61.6)	451	
Yes	711 (61.1)	36 (39.6)	747		572 (55.2)	25 (29.1)	597	
Don't know	74 (6.4)	12 (13.2)	86		66 (6.4)	8 (9.3)	74	
Total	1164	91	1255		1036	86	1122	

* At 6 months –the question was 'at what age baby was given solids'

At 6 months

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
Use any special food or herbal preparation to promote production of breastmilk				0.930				0.161
No	1072 (96.5)	87 (96.7)	1159		983 (97.7)	80 (95.2)	1063	
Yes	39 (3.5)	3 (3.3)	42		23 (2.3)	4 (4.8)	27	
Total	1111	90	1201		1006	84	1090	
Baby had any of the following since the last interview				0.721				**0.015**
Baby not gaining enough weight	20 (9.5)	3 (15.0)	23		18 (78.3)	5 (21.7)	23	
Baby has difficulties sucking	16 (7.6)	2 (10.0)	18		18 (94.7)	1 (5.3)	19	
Baby refuses to breast-feed	53 (25.2)	5 (25.0)	58		50 (89.3)	6 (10.7)	56	
Baby too tired to feed	108 (51.4)	8 (40.0)	116		29 (80.6)	7 (19.4)	36	
2 or more of the above	13 (6.2)	2 (10.0)	15		9 (90.0)	1 (10.0)	10	
Total	210	20	230					
How would you rate your confidence in breastfeeding				**0.007**				**0.011**
Totally not confident	4 (0.3)	2 (2.2)	6		5 (0.5)	2 (2.2)	7	
Not confident	13 (1.1)	4 (4.3)	17		11 (1.0)	4 (4.4)	15	
Neutral	138 (11.7)	11 (12.0)	149		97 (9.1)	11 (12.1)	108	
Confident	719 (60.7)	48 (52.2)	767		676 (63.4)	51 (56.0)	727	
Very confident	310 (26.2)	27 (29.3)	337		278 (26.1)	23 (25.3)	301	
Total	1184	92	1276		1067	91	1158	

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
Totally not enjoyable	2 (0.2)	0	2		1 (0.1)	0	1	
Not enjoyable	9 (0.8)	0	9		1 (0.1)	0	1	
Neutral	204 (17.2)	17 (18.5)	221		141 (13.2)	21 (23.1)	162	
Enjoyable	728 (61.4)	50 (54.3)	778		702 (65.9)	50 (54.9)	752	
Very enjoyable	242 (20.4)	25 (27.2)	267		220 (20.7)	20 (22.0)	240	
Total	1185	92	1277		1065	91	1156	
How satisfied are you with your breastfeeding experience?				**0.037**				**0.022**
Totally not satisfied	2 (0.2)	0	2		2 (0.2)	1 (1.1)	3	
Not satisfied	21 (1.8)	6 (6.5)	27		17 (1.6)	5 (5.4)	22	
Neutral	143 (12.0)	12 (13.0)	155		86 (8.1)	11 (12.0)	97	
Satisfied	746 (62.8)	51 (55.4)	797		693 (64.9)	54 (58.7)	747	
Very satisfied	275 (23.2)	23 (25.0	298		269 (25.2)	21 (22.8)	290	
Total	1187	92	1279		1067	92	1159	
In general, how comfortable do you feel while breastfeeding in front of others				0.327				0.133
Totally not comfortable	77 (6.5)	9 (9.8)	86		65 (6.1)	6 (8.5)	71	
Not comfortable	227 (19.2)	22 (23.9)	249		203 (19.0)	25 (11.0)	228	
Neutral	196 (16.5)	15 (16.3)	211		116 (10.9)	14 (10.8)	130	
Comfortable	617 (52.1)	44 (47.8)	661		614 (57.5)	41 (6.3)	655	
Very comfortable	68 (5.7)	2 (2.2)	70		70 (6.6)	5 (6.7)	75	
Total	1185	92	1277		1068	91	1159	

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
How old was your baby when you stopped breast-feeding?				0.174				0.627
0-4 weeks	33 (32.4)	6 (54.5)	39		36 (20.5)	3 (13.0)	39	
5-8 weeks	48 (47.0)	2 (18.2)	50		35 (19.9)	6 (26.1)	41	
9-12 weeks	21 (20.6)	3 (27.3)	24		40 (22.7)	5 (21.7)	45	
13-18 weeks					36 (20.5)	3 (13.0)	39	
19-24 weeks					29 (16.5)	6 (26.1)	35	
Total	102	11	113		176	23	199	
Why did you stop breastfeeding?				0.786				0.333
Not enough milk	39 (36.4)	5 (33.3)	43		65 (39.2)	10 (41.7)	75	
I'm working	33 (30.8)	5 (33.3)	37		44 (26.5)	3 (12.5)	47	
Baby refused breastmilk	22 (20.6)	3 (20.0)	24		27 (16.3)	7 (29.2)	34	
Problems with breasts	7 (6.5)	2 (13.3)	9		6 (3.6)	0	6	
Mother and baby's health problems	6 (5.6)	0	6		24 (14.5)	4 (16.7)	28	
Total	107	15	122		166	24	190	
Who advise you to stop breastfeeding?				0.529				0.280
Nobody	108 (90.8)	15 (93.8)	123		48 (84.2)	7 (70.0)	55	
Others	11 (9.2)	1 (6.2)	12		9 (15.8)	3 (30.0)	12	
Total	119	16	135		57	10	67	
When you stop breastfeeding did you plan to stop?				0.742				0.101
No	93 (70.5)	12 (66.7)	105		138 (77.1)	22 (91.7)	160	
Yes	39 (29.5)	6 (33.3)	45		41 (22.9)	2 (8.3)	43	
Total	132	18	150		179	24	203	

	3 months				6 months			
	EPDS<12	EPDS≥12	Total	p-value	EPDS<12	EPDS≥12	Total	p-value
Disappointed for not breastfeeding longer				0.625				0.523
No	61 (46.2)	6 (33.3)	67		92 (51.7)	9 (37.5)	101	
Yes	71 (53.8)	12 (66.7)	83		86 (48.3)	15 (62.5)	101	
Total	132	18	150		178	24	202	
Feel guilty for not breastfeeding longer?				0.717				0.076
No	72 (54.5)	9 (50.0)	81		108 (60.7)	10 (41.7	118	
Yes	60 (45.5)	9 (50.0)	69		70 (39.3)	14 (58.3)	84	
Total	132	18	150		178	24	202	
Have other people made you feel guilty for not breast-feeding for longer?				0.578				0.592
No	121 (91.7)	14 (87.5)	135		169 (94.4)	22 (91.7)	191	
Yes	11 (8.3)	2 (12.5)	13		10 (5.6)	2 (8.3)	12	
Total	132	16	148		179	24	203	
Would you breast-feed another child if you had another baby?				0.167				0.188
No	10 (7.6)	3 (17.6)	13		9 (5.0)	1 (4.2)	10	
Yes	83 (62.9)	7 (41.2)	90		114 (63.7)	11 (45.8)	125	
Yes, if I could	39 (29.5)	7 (41.2)	46		56 (31.3)	12 (50.0)	68	
Total	132	17	149		179	24	203	